

ORD 500-92-0050
92-068-01-TANED-"

ORDI-14-00180
00-180-02-TJN 79- ...



Abt Associates Inc.

Cambridge, MA
Lexington, MA
Hadley, MA
Bethesda, MD
Washington, DC
Chicago, IL
Cairo, Egypt
Johannesburg, South Africa

Evaluation of the Community Nursing Organization Demonstration Final Report

April 13, 2000

Prepared for:
Health Care Financing Administration
Mailstop C3-21-26
7500 Security Boulevard
Baltimore, MD 21244-1850

Prepared by:
Abt Associates Inc.
55 Wheeler Street
Cambridge, MA 02138

Table of Contents

Executive Summary

| | | |
|-----|---|----|
| 1.0 | The CNO Demonstration | 1 |
| 1.1 | The CNO Demonstration: Eligibility, Services and Payment | 1 |
| 1.2 | CNO Operations | 4 |
| 1.3 | The CNO Evaluation | 5 |
| 1.4 | The CNO Intervention and Individual Outcomes | 5 |
| 1.5 | References | 8 |
| 2.0 | History and Operation of the CNOs | 10 |
| 2.1 | Introduction to the Community Nursing Organizations | 10 |
| 2.2 | The OBRA 1987 Mandate: Framework for the CNO Demonstration | 10 |
| 2.3 | CNO Operations: Implementing the OBRA '87 Mandate | 13 |
| 3.0 | The CNO Evaluation: Design and Analysis | 17 |
| 3.1 | Experimental Design | 17 |
| 3.2 | Person-Level Samples for the Analysis on This Report | 20 |
| 3.3 | Data Sources for the Quantitative Evaluation | 22 |
| 3.4 | Response Rates to Baseline and Follow-up Assessments | 29 |
| 4.0 | CNO Enrollment | 35 |
| 4.1 | Introduction | 35 |
| 4.2 | Enrollment in the CNOs | 38 |
| 4.3 | Sociodemographic Characteristics of the CNO Applicants | 40 |
| 4.4 | Disenrollment from the CNO | 43 |
| 5.0 | Health Functioning and Mortality | 56 |
| 5.1 | Introduction | 56 |
| 5.2 | Outcome Measures | 56 |
| 5.3 | Analytic Approach | 57 |
| 5.4 | Data | 57 |
| 5.5 | Results | 58 |
| 5.6 | Discussion | 62 |
| 5.7 | References | 63 |
| 6.0 | Results: Satisfaction, Health Knowledge and Preventive Care | 64 |
| 6.1 | Introduction | 64 |
| 6.2 | Outcome Measures | 64 |
| 6.3 | Analytic Approach | 64 |
| 6.4 | Data | 64 |
| 6.5 | Results | 65 |
| 6.6 | Discussion | 69 |

| | | |
|------|---|-----|
| 7.0 | Utilization | 72 |
| 7.1 | Overview | 72 |
| 7.2 | Timesheet Records | 72 |
| 7.3 | Survey Analysis | 77 |
| 7.4 | CNO Utilization and Medicare Claims | 80 |
| 7.5 | Conclusion | 123 |
| 8.0 | Medicare Expenditures | 124 |
| 8.1 | Introduction | 124 |
| 8.2 | Analytic Approach | 124 |
| 8.3 | Data | 126 |
| 8.4 | Results | 126 |
| 8.5 | Discussion | 134 |
| 8.6 | References | 134 |
| 9.0 | The CNO Demonstration Sites | 135 |
| 9.1 | Introduction | 135 |
| 9.2 | Carle Clinic | 135 |
| 9.3 | Carondelet Health Care | 137 |
| 9.4 | The Living at Home/Block Nurse Program CNO | 139 |
| 9.5 | The Visiting Nurse Service of New York CNO | 141 |
| 10.0 | Cross-Case Observations Based on the Site Studies | 144 |
| 10.1 | Introduction | 144 |
| 10.2 | Increasing Emphasis on Risk Assessment | 144 |
| 10.3 | Increasing Emphasis on Functionality | 147 |
| 10.4 | The Evolving Roles of Nurses and Physicians | 147 |
| 10.5 | Demonstration Constraints | 148 |
| 10.6 | Impact of Cultural Differences | 149 |
| 10.7 | Future Directions | 149 |
| 10.8 | References | 150 |

Executive Summary

The Community Nursing Organization (CNO) Demonstration was implemented on January 1, 1994. It was designed to test a system of capitated payment for specified community nursing services covered by Medicare. The demonstration operated in four sites: Carle Clinic (Urbana IL), Carondelet Health Care (Tucson AZ), the Living at Home/Block Nurse Program (Minneapolis MN), and the Visiting Nurse Service (New York NY). The CNOs are at full financial risk for all care provided under the service package.

The demonstration was implemented as a social experiment. Applicants were informed during the introductory information session that there was a one-third probability that they would not be allowed to enroll in the CNO but would instead be assigned to a control group. Members of the control group received care in whatever way they would have had there been no demonstration. All beneficiaries who wished to apply to a CNO after being informed of the requirements of participation and the of the process of randomization were interviewed prior to randomization. The interview elicited information about the applicant's background, health and functional status, behaviors, recent use of health care, and overall satisfaction with care. The interview was repeated by telephone 15 months after the time of randomization and again 27 and 39 months after randomization.

Interim Evaluation Reports were issued in May 1996 and April 1998. They described program outcomes at earlier stages of the demonstration. Those reports found no statistically significant differences in health and functioning between the treatment and control groups. Medicare expenditures for the treatment group, however, were found to be uniformly greater than for the control group.

This final report analyzes follow-up interview data and Medicare claims and payment information for 10,632 beneficiaries randomized between January 1994 and September 1995. Utilization and expenditure data were collected for up to 42 months following randomization.

Effects of the CNO on individual outcomes were assessed using 27-month and 39-month changes in well-known measures of health and functional status, including the physical component summary (PCS) and mental component summary (MCS) of the SF-36, Activities of Daily Living, and questions regarding satisfaction with care. No statistically significant differences in the PCS between the treatment and the control groups emerged, whether at 27 months or 39 months after random assignment. Over the longest possible follow-up period (39 months), assignment to the treatment group was associated with a small but statistically significant increase in the MCS when data from all four CNO sites were combined. It is possible that the periodic assessments and the continuing availability of contact with the CNOs, by telephone or at some other location, is a source of reassurance for many enrollees, producing a small increment to the MCS. At one site, VNS, functional ability, as measured by a combined ADL/IADL scale, appeared to be enhanced by the CNO, although it was impossible to state definitively that this was a direct result of the intervention.

There were no statistically significant effects of CNO enrollment on measured health behaviors. The proportions of individuals who changed smoking habits, wore automobile seat belts, received an annual vaccination for influenza, and who exercised each week were the same for the treatment and control groups. There was a tendency to members of the treatment group to be somewhat more knowledgeable about their blood pressure, serum cholesterol and medications, though these differences were not always statistically significant.

In all four sites, Medicare payments for the treatment group (including capitation payments) exceeded those for the control group. Virtually all of the discrepancy was accounted for by an excess of capitation and case management payments over the expected payments for CNO-type services provided to the control group. Demonstration rates, computed using the *average* utilization of CNO-type services, were probably set at a level above the expected Medicare expenditure for the typically healthy individuals who applied to the CNO. To achieve budget neutrality, CNO capitation payments would need to decline by an average of \$25 to \$74 per person per month.

1.0 The CNO Demonstration

The Community Nursing Organization (CNO) demonstration was created by the Omnibus Budget Reconciliation Act of 1987. Under the demonstration CNOs received a monthly capitation fee from Medicare for each member and in return accepted full financial risk for providing Medicare-covered home health, durable medical equipment, ambulance service and supplies for member beneficiaries. Like managed care organizations, CNOs could exercise substantial discretion in organizing care in the most efficient and productive way. Unlike managed care organizations, they were not responsible for *all* Medicare-covered services. CNO enrollees received care from physicians, hospitals and other facilities in the same manner as all other Medicare fee-for-service beneficiaries.

To carry out the CNO demonstration, the Health Care Financing Administration in 1993 entered into cooperative agreements with the following four eligible organizations to serve as demonstration providers:

- Carondelet Health Care, Tucson AZ
- Carle Clinic, Urbana IL
- Living at Home/Block Nurse Program, Minneapolis MN
- Visiting Nurse Service, New York NY

Key interventions under the demonstration included: 1) the assumption of full risk for the provision of CNO services, as mandated under OBRA; and 2) nurse case management, including in-person assessments of all members at six-month intervals. Sites were paid an additional \$20 per member per month at the inception of the demonstration to perform these assessment services.¹

1.1 The CNO Demonstration: Eligibility, Services and Payment

Eligibility and Enrollment

All Medicare beneficiaries residing in catchment areas close to the CNOs, who were entitled to benefits under Part A and who are enrolled in Part B of Medicare were eligible to enroll in the CNO, with the following exceptions:

- beneficiaries enrolled in Medicare risk HMOs.
- beneficiaries receiving care under the Medicare hospice benefit, and
- beneficiaries entitled to Medicare under the End Stage Renal Disease (ESRD) benefit.

Each CNO site was required to hold at least one open enrollment period during the operational phase of the demonstration and to accept any eligible beneficiary who applied for membership. Those accepted into the demonstration were randomly assigned to treatment and control groups for the evaluation.

¹ This amount was increased to \$21 on January 1 1995 and to \$22 on January 1 1996.

CNO members were allowed to disenroll at the end of a calendar month for any reason. No enrollee could be forced to leave the CNO due to high service use. However, under the following conditions, a CNO was required to disenroll a member. These conditions were:

- failure to maintain enrollment in Parts A and B of Medicare;
- institutionalization for 60 or more consecutive days;
- enrollment in a Medicare risk HMO;
- use of the Medicare hospice benefit;
- residence outside of the CNO service area for more than 30 consecutive days;
- persistent use of out-of-plan care for CNO mandatory services while enrolled in the CNO; or
- refusal of mandatory six-month assessment.

Sites began randomization and enrollment on January 1, 1994, with the expectation that the demonstration would last for three years. In 1996, the Health Care Financing Administration extended the CNO demonstration and evaluation for an additional year. The Balanced Budget Act of 1997 subsequently granted a further two-year extension for the project. The evaluation of the CNO demonstration, however, will cover the four-year period 1994-1997.

Covered Services

OBRA 1987 required that certain services be provided as part of the CNO service package. These services were further clarified by contracts between HCFA and the four CNO sites to include:

- *Home health services* as defined in 42 CFR 409.40-409.42, provided by qualified personnel who meet the qualifications specified in 42 CFR 484.4. Home health services are regular Medicare covered home health agency services or comparable level CNO services, which may be authorized by either a physician or a CNO nurse, furnished to home-bound patients. These services include:
 - part-time or intermittent nursing care provided by or under the supervision of a registered professional nurse;
 - physical, speech, and occupational therapy;
 - medical social services supportive plan of care; and
 - part-time or intermittent services of a home health aide furnished under the supervision of a registered nurse.
- *Medical supplies, appliances, and devices* as defined in 42 CFR 410.36, including:
 - surgical dressings, and splints, casts, and other devices used for reduction of fractures and dislocations;
 - prosthetic devices, other than dental, that replace all or part of an internal body organ, including colostomy bags and supplies directly related to colostomy care; and
 - leg, arm, back, and neck braces and artificial legs, arms, and eyes.
- *Durable medical equipment* as defined in 42 CFR 410.38, to be used in the patient's home.

- *Ambulance services* as defined in 42 CFR 410.40, when:
 - medically necessary because other means of transportation would endanger the beneficiary's health.
 - the enrollee is not a hospital inpatient, and
 - the transportation is not by air or water.

[Ambulance service was removed from the CNO package on January 1, 1997.]

- *Outpatient physical therapy services* as defined in 42 CFR 410.60, provided by or under the supervision of a licensed physical therapist who meets the qualifications specified in 42 CFR 405.1702(d).
- *Outpatient speech pathology services* as defined in 42 CFR 410.62, provided by a licensed speech pathologist who meets the qualifications specified in 42 CFR 405.102(k).
- *Medical supplies* (other than drugs and biologicals) furnished while an enrollee is under a plan of care, if the supplies are of the type that are commonly furnished in a physician's office or clinic and are commonly furnished either without charge or included in the physician's or clinic's bill.
- Services furnished by a *clinical psychologist* who meets the qualifications specified in 42 CFR 417.416(d)(2)(i) through (iii), or a *clinical social worker* as defined in section 1861(hh) of the Social Security Act, as well as services and supplies furnished as an incident to their services.
- Part-time or intermittent *nursing care* and related medical supplies (other than drugs and biologicals) furnished by a registered professional or licensed practical nurse employed or under arrangement with a Medicare certified *rural health clinic*.
- Certain other related services listed in section 1915(c)(4)(B) of the Act. For purposes of the CNO, *case management*, a 1915(c)(4)(B) service, must be provided. It is defined as services which assist enrollees in gaining access to and coordinating/approving utilization of needed medical, social, educational and other services. In the CNO, this service must include providing an in-person assessment and updating the patient's care plan every six months. This service also includes coordinating these services with other providers and monitoring the enrollee's progress towards the achievement of objectives specified in the patient's CNO plan.

Capitation and Case Mix Adjustment

Each of the four CNOs received a monthly payment for each enrolled member. Payment amounts were based on the local average annual per capita cost for Medicare-covered services that are part of the CNO's package. These rates in turn were adjusted for case mix as directed by OBRA. In all sites, payments were adjusted for age, sex, and number of Medicare-covered home health visits in the previous six months. In three of the sites (AZ, MN, and NY) payments were further adjusted for the number of limitations in activities of daily living (ADLs) experienced by the enrollee. This resulted

in a total of 39 payment cells for those three sites. Payments to the Carle Clinic (IL) site were not adjusted for ADL limitations and were based on 13 payment cells. Following each 6-month reassessment, enrollees were assigned to the payment cell appropriate for their age, home health utilization, and (in three sites) number of ADL limitations.

1.2 CNO Operations

Recruitment and Intake

Each site developed its own strategy for marketing and recruitment of eligible beneficiaries. All sites relied on physician referrals, direct mail, and word of mouth. Some sites also used brochures, fliers, group presentations, television and newspaper advertising, and telemarketing efforts. Because the demonstration was conducted as an experiment, with random assignment to treatment or control groups, it was important that beneficiaries who expressed interest in the program understand that there was a 1/3 probability that they would be assigned to a control group and not be enrolled in the CNO. Sites were therefore required to secure informed consent from each applicant. The consent document informed the applicant that the CNO was a temporary demonstration project, that, if enrolled, he or she must agree to receive all care in the CNO service package *only* from the CNO, that he or she would be enrolled in the CNO only if assigned to the treatment group, and that he or she would be contacted by Abt Associates for telephone interviews at one-year intervals.

After securing informed consent from the applicant, a CNO staff person conducted a baseline interview with the applicant. The interview elicited information on health, mental status, functional limitations, health risk, demographic characteristics, attitudes toward health providers and satisfaction with care. Applicants were randomized after the interview. (The randomization procedure is described in Chapter 2.) Applicants assigned to the control group were thanked for their participation and informed that they could not receive services from the CNO. Applicants assigned to the treatment group were further assessed, if necessary, to facilitate care planning and case management and were enrolled in the CNO.

Case Management

Aside from the requirement that every CNO member be evaluated in person at six-month intervals, each of the CNO sites was free to define and configure the process of case management in the way it judged to be most beneficial to the member and efficient for the organization. Methods of assessment, resources devoted to planning and monitoring, as well as the number of members whose care was actively managed, therefore, differ from site to site. Although the benefits and cost effectiveness of case management for the frail or chronically ill are fairly well established (Cohen, 1991), the value of case management in the broader population of the "generally well elderly" remains unknown. Because the demonstration has only four sites and because the case management intervention is not experimentally varied across sites or individuals, the evaluation will be unable to distinguish the distinct effects of capitation and case management on beneficiary outcomes, utilization, or cost.

1.3 The CNO Evaluation

The CNO demonstration was implemented as a social experiment. All CNO applicants were randomized into treatment and control groups. Two applicants were assigned to the treatment group for every one assigned to the control group. The experimental design provided for a clearer path to inference than did the prospective observational study, which relied on comparisons of individuals who choose to enroll with those who did not. Under the observational design, distinguishing the effects of the CNO from the effects of unobservable characteristics and traits of individuals who joined, relative to those who did not, can be a nearly impossible undertaking. All methods for making the distinction between treatment (CNO) and so-called "selection" effects necessarily rely on ancillary assumptions whose validity cannot be evaluated directly (Burtless, 1995).

For all its benefits, randomization does not guarantee accurate or even unbiased estimates. The most serious difficulty is that individuals randomized to the treatment group may fail, for a number of reasons, to enroll in the CNO. In addition, those who may enroll, may drop out of the CNO after a short time. These individuals cannot be eliminated from the analysis without reintroducing the problem that randomization was designed to fix — selection bias.² In strictest terms, the evaluation measures the effect of assignment to the treatment group. If nearly all individuals so assigned actually enrolled and remained in the CNO, then assignment to the treatment group is essentially identical to receipt of the CNO "treatment." Although methods to correct for a higher dropout rate have been developed (e.g., Imbens and Angrist, 1994), they generally exhibit low statistical power. In consequence, a substantial rate of nonenrollment or disenrollment remains a clear threat to the evaluation.

1.4 The CNO Intervention and Individual Outcomes

Experiments with care delivered under a capitation arrangement that involve delegation of decision-making and authority can usually be understood to aim at familiar goals — either enhancing health and well-being without increasing cost, or at mild increases in cost, or else a reduction in cost with no measurable sacrifice in health, functioning, or satisfaction. In order for the CNO to have any effect on enrollee outcomes, it must impinge on the lives of those enrollees in some way that is different from what would have occurred in its absence. This leads us naturally to ask what scope of action was available to the CNOs to effect improvements in cost and outcomes.

The CNO demonstration altered the provision of ambulatory care to the treatment group in two ways. First, the CNOs assumed full financial risk for all care in the CNO service package, in return for a monthly capitation payment for each enrollee. Second, the CNOs provided nurse case management to all enrollees, including in-person assessments for all members at six-month intervals. These alterations gave rise to three mechanisms by which CNOs could alter directly the manner in which resources were used to maintain and improve the health and functioning of enrollees.

2 Removing these individuals from the analysis would introduce no problems if those individuals who would have either failed to enroll or dropped out could be removed also from the control group. Since these latter individuals are unknown, this strategy is clearly impossible.

- The CNO was accorded much greater discretion in the provision of Medicare-covered services. Hence the individual needs of an enrollee could be accorded greater importance than under fee-for-service Medicare, which requires determinations of coverage and medical necessity.
- The CNO could employ the most appropriate forms of care, and could choose to provide services not traditionally covered by Medicare, such as prevention and health promotion, if these were judged to be more effective for the enrolled population
- More frequent screening (via the six-month reassessment) could identify some conditions at an earlier point than in its absence.

Because the literature is a poor guide to the effects of these mechanisms on health outcomes, few clear hypotheses emerge. CNO services were financed through capitation payments, an arrangement which removes the link between service provision and payment and also affords the CNOs the increased discretion in matching services to enrollee needs. Purely financial incentives motivate CNOs to provide fewer services than they would if they were paid separately for each service. In the only study to date comparing Medicare home health care under HMO and fee-for-service (FFS) arrangements, Schlenker, Shaughnessy and Hittle (1995) found evidence that providers responded to these incentives. Among Medicare beneficiaries who received some home health care, those who were enrolled in Medicare risk HMOs received fewer home health visits on average than beneficiaries who remained under fee-for-service Medicare, even after adjustment for casemix, location, and demographic characteristics. In a separate article, Shaughnessy, Schlenker and Hittle (1994) found that these same beneficiaries experienced somewhat better outcomes under fee-for-service, leading them to speculate that "most HMO patients are underserved in terms of the number of home health visits."

It should be noted that the service package and payment structure faced by the CNOs could produce stronger financial incentives to restrict services than those faced by the HMOs studied by Shaughnessy, Schlenker and Hittle. Most acute care services covered by Medicare (in particular hospital and physician services) were *outside* the CNO service package. Hence at least some portion of any financial consequences of a reduction in services (relative to FFS) would not be borne by the CNO as they would by a Medicare risk HMO. Consider for example a CNO and a Medicare risk HMO each contemplating the provision of home care costing \$200 to a member. Suppose that both providers believe that this care will reduce the probability that the member is hospitalized in the current month by 0.1. Both providers will incur a cost of \$200 by providing the care. The expected financial benefit from providing the care is 0.1 times the cost of the hospitalization for the HMO. The expected financial benefit for the CNO is zero. This argument does not imply that the CNO would fail to provide the care in question — only that the *financial* incentives to provide the care are weaker for the CNO than for the HMO.

Although capitation does reduce the incentive to provide services, it also permits greater flexibility for the provision of services that the CNO case manager considers most appropriate, even if the services are not covered by the Medicare fee-for-service program. These may include homemaker services, preventive care, health promotion classes (e.g., smoking cessation, cholesterol and weight control, exercise classes, etc.) or telephone consultations. Therefore while we may hypothesize that the number of Medicare-covered home health visits per month or the proportion of individuals

receiving durable medical equipment (DME) will be lower among CNO enrollees than among the control group, this does not imply that enrollees necessarily received fewer total services or that those services are of lesser value or effectiveness than those received by the control group.

Whether nurse case management can be expected to markedly improve the health of CNO members or the cost-effectiveness of their care is difficult to predict. The relevant literature provides little guidance on the issue. The benefits claimed for case management are typically rooted in the assertion that health services to a substantial portion of the elderly are heavily fragmented. But evidence that such fragmentation seriously compromises care has been difficult to find because of the paucity of studies directly comparing case-managed and non-case managed elderly populations. Despite studies comparing alternative approaches to case management (Eggert et al., 1991) or evaluating the internal efficiency of resource use by case managers (Davidson, Muscovic, and McCaffrey, 1989), most studies that compare outcomes associated with case management to outcomes in the absence of case management have been limited to psychiatric populations (e.g., Jerrell and Hu, 1989).

Quite recently, Burns, Lamb and Wholey (1996) found that provision of nurse case management services during and after hospitalization to certain high-risk members of a senior risk plan resulted in a significant reduction in subsequent hospitalizations and outpatient visits. A critical feature of the case management system studied by the authors was *targeting* of individuals believed to be at high risk. While there is little direct evidence on the subject, an emerging consensus appears to have formed that effective case management requires successful targeting. Eggert et al. (1991) argued that the success of the team model of case management relied in part on targeting a "high use/high cost group." And Kemper (1988) among others, argued that failure to target services properly contributed to the absence of significant results in the Channing demonstration.

For the most part, the individual CNO projects have been free to develop nurse case management and tailor it to the needs of the enrolled population. One element of case management under the CNO, a health assessment, conducted in person every six months, was required for all members. Periodic assessment of the elderly has been examined in several studies with conflicting results. Tulloch and Moore (1979) reported that after two years, a randomly chosen group of patients aged 70 and over showed no significant change in functional or medical disorders relative to a control group. Nevertheless, the authors reported that "there was some evidence to suggest that they were kept independent for longer and when admitted to hospital, their duration of stay was significantly shorter than control group patients." Hendriksen, Lund and Strömgaard (1984) found stronger evidence for beneficial effects of screening in a randomized trial conducted among individuals aged 75 and over in a suburb of Copenhagen, Denmark. Members of the treatment group were visited in their homes every three months. After three years, the treatment group was found to have experienced lower mortality, lower probability of hospital admission, and a strong suggestion of reduced use of emergency medical service. No differences were found in the number of physician visits or home nursing visits. In a similarly designed three-year study, van Rossum et al. (1993) found no effect of home visits four times per year on the health of study subjects aged 75-84. Further analysis of the data, however, identified dramatic treatment effects among those who had initially rated their health as poor. The treatment group averaged 20 hospital days per person over the three-year period versus 39 for the control group.

The aforementioned studies, while suggestive, need not bear directly on expectations for the CNOs since the interventions in most cases were more rigid. To the extent that CNOs effectively targeted

and individualized their prevention and health promotion activities, their outcomes and cost-effectiveness could turn out to be superior to those observed in earlier studies.

1.5 References

- American College of Physicians. "Preventive Care Guidelines: 1991" *Annals of Internal Medicine* 114 (1991): 758-83.
- Burtless, Gary. "The Case for Randomized Field Trials in Economic and Policy Research" *Journal of Economic Perspectives* 9 (Spring 1995): 63-84.
- Branch, L and A Jette. "Health Practices and Incident Disability Among the Elderly" *American Journal of Public Health* 75 (1985): 1436-39.
- Burns, Lawton, Gerri Lamb and Douglas Wholey. "Impact of Integrated Community Nursing Services on Hospital Utilization and Costs in a Medicare Risk Plan" *Inquiry*: 33 (Spring 1996): 30-41.
- Cohen, Elaine. "Nursing Case Management: Does it Pay?" *Journal of Nursing Administration* 21 (April 1991): 20-25.
- COMMIT Research Group. "Community Intervention Trial for Smoking Cessation (COMMIT): II. Changes in Adult Cigarette Smoking Prevalence," *American Journal of Public Health* 85 (February 1995): 193-200.
- Davidson, G, I Muscovice and D McCaffrey. "Allocative Efficiency of Case Managers for the Elderly," *Health Services Research* 24 (October 1989): 539-54.
- Eggert, G, J Zimmer, W Jackson, and B Friedman. "Case Management: A Randomized Controlled Study Comparing a Neighborhood Team and a Centralized Individual Model," *Health Services Research* 26 (October 1991): 471-507.
- Fries, James, Lawrence Greene and Sol Levine. "Health Promotion and the Compression of Morbidity," *Lancet* 1 (1989): 481-83.
- Hendriksen, C, E Lund and E Stromgård. "Consequences of Assessment and Intervention Among Elderly People: A Three Year Randomised Controlled Trial" *British Medical Journal* 289 (1 December 1984): 1522-24.
- Imbens, Guido and Joshua Angrist. "Identification and Estimation of Local Average Treatment Effects" *Econometrica* 62 (March 1994): 467-76.
- Jerrell, JM and T Hu. "Cost Effectiveness of Intensive Clinical and Case Management Compared with an Existing System of Care," *Inquiry* 26 (1989):224-34
- Kawachi, Ichiro, Graham Colditz, Meir Stampfer, Walter Willett et al. "Smoking Cessation and Time Course of Decreased Risks of Coronary Heart Disease in Middle-Aged Women," *Archives of Internal Medicine* 154 (January 24 1994): 169-75.

- Kemper, Peter. "The Evaluation of the National Long Term Care Demonstration 10. Overview of Findings." *Health Services Research* 23 (April 1988): 161-174
- Kennie, David *Preventive Care for Elderly People*. New York: Cambridge University Press. 1993.
- King, Eunice, Barbara Rimer, Janet Seay et al. "Promoting Mammography Use through Progressive Interventions: Is It Effective?" *American Journal of Public Health* 84 (January 1994): 104-106.
- Lantz, Paula, Debra Stencil, MaryAnn Lippert et al. "Breast and Cervical Cancer Screening in a Low-Income Managed Care Sample. The Effect of Physician Letters and Phone Calls," *American Journal of Public Health* 85 (June 1995): 834-36.
- Luepker, Russell, David Murray, David Jacobs et al. "Community Education for Cardiovascular Disease Prevention: Risk Factor Changes in the Minnesota Heart Health Program," *American Journal of Public Health* 84 (September 1994): 1383-93.
- McCormick, J and P Skrabaneck. "Coronary Heart Disease is not Preventable by Population Interventions," *Lancet* ii (1988): 839-41.
- Posner, JD, KM Gorman and LN Gitlin. "Effects of Exercise Training in the Elderly on the Occurrence and Time to Onset of Cardiovascular Diagnosis," *Journal of the American Geriatric Society* 38 (1990): 205-10.
- van Rossum, Erik, Carla Fredericks, Hans Philipson, et al. "Effects of Preventive Home Visits to Elderly People" *British Medical Journal* 307 (3 July 1993): 27-32.
- Schlenker, Robert, Peter Shaughnessy and David Hittle. "Patient-Level Cost of Home Health Care Under Capitated and Fee-for-Service Payment," *Inquiry* 32 (Fall 1995): 252-70.
- Shaughnessy, Peter, Robert Schlenker and David Hittle. "Home Health Care Outcomes Under Capitated and Fee-for-Service Payment" *Health Care Financing Review* 16 (Fall 1994): 187-222.
- Tabar, L, CJG Fagerberg, A Gad et al. "Reduction in Mortality from Breast Cancer after Mass Screening with Mammography" *Lancet* i (1985): 829-32.
- Tulloch, A.J. and V. Moore. "A Randomized Controlled Trial of Geriatric Screening and Surveillance in General Practice" *Journal of the Royal College of General Practitioners* 29 (December 1979): 733-42.

2.0 History and Operation of CNOs

2.1 Introduction to Community Nursing Organizations

The Community Nursing Organization (CNO) Demonstration is an innovative approach to the provision of community nursing and ambulatory care services for Medicare beneficiaries. Structured around two fundamental concepts of nurse case management and capitated payment, CNOs attempt to promote the timely and appropriate use of community health services and reduce the use of costly acute-care services.

The impetus for developing the CNO model stemmed from limitations in traditional fee-for-service Medicare. Parts A and B of Medicare only reimburse care that is ordered by a physician and supplied by certain providers under certain specified conditions. Medicare generally has no provision for reimbursing preventive care, health promotion, or care not authorized by a physician, services that might lead to lower medical costs and improved health outcomes for Medicare beneficiaries. Since 1985, Medicare HMOs have aimed to compensate for these limitations by attempting to provide a broader and more flexible array of services, in return for a fixed monthly payment for each subscriber. However, many Medicare beneficiaries are reluctant to join HMOs, since the organizations typically restrict members' choice of providers.

The CNO concept provided an alternative to both traditional fee-for-service Medicare and Medicare HMOs. Like HMOs, CNOs would be funded by flat monthly Medicare payments for each enrolled member and would be responsible for operating within that budget. CNO nurses would coordinate the provision of health care services for each enrollee, attempting to respond to new health problems quickly and prevent health crises from arising, thus avoiding higher future health costs.

2.2 The OBRA 1987 Mandate: Framework for the CNO Demonstration

2.2.1 Capitated Payment Approach

The Omnibus Budget Reconciliation Act (OBRA) of 1987 mandated the CNO Demonstration to test this new payment mechanism for Medicare-covered community and out-patient care. The mandate stated that the CNOs would provide home health care, durable medical equipment, ambulance services,¹ and supplies to their members, accepting full financial risk for these services in return for a monthly capitation fee from Medicare for each member. The capitated payment approach was intended to replace the multiple fee-for-service payments currently used for these services. Like Medicare HMOs, the CNOs could exercise substantial discretion in organizing care in the most efficient and productive way. Unlike HMOs, they were not made responsible for *all* Medicare-covered services. CNO enrollees received care from physicians, hospitals, and other facilities in the

¹ Ambulance services were dropped from the mandated service package as a result of a contract modification on January 1, 1997.

same manner as all other Medicare beneficiaries. Payment for these services was not covered by the CNO.

2.2.2 Nurse Case Management

One of the primary objectives of the CNO Demonstration was to reduce the fragmentation of senior citizen care through better coordination and appropriate use of services. OBRA '87 mandated the implementation of nurse case management in the CNOs. CNO case managers, called Primary Nurse Providers (PNPs), had primary responsibility for prescribing nursing care and coordinating a variety of services. They were required to perform in-person assessments of all members at six-month intervals.

2.2.3 Demonstration Evaluation

OBRA '87 also mandated an evaluation of the CNO demonstration. Abt Associates Inc. was contracted by the Health Care Financing Administration to examine whether the CNO system could exist as an operationally and financially viable organization. Abt Associates has further aimed to examine the effect of CNO membership on the enrollees' use of health services covered under the CNO package, as well as services such as physician and in-patient hospital care which are covered by Medicare but were not part of the CNO package. The evaluation was structured with an experimental design. All CNO applicants were randomized into treatment and control groups, with two applicants assigned to the treatment group for every one assigned to the control group.

2.2.4 Sites

Through a competitive selection process, the Health Care Financing Administration chose four diverse sites to set up CNOs for the demonstration:

- Carle Clinic in Urbana, IL, a for-profit private physician group practice;
- Carondelet Health Care in Tucson, AZ, a Catholic, non-profit, full-service health care corporation;
- Living At Home/Block Nurse Program (LAH/BNP) in Minneapolis, MN, a community-based nursing program for the elderly, in partnership with HealthSpan, the largest home health agency in the state; and
- Visiting Nurse Service of New York (VNSNY) in New York City, the largest non-profit Medicare certified home health agency in the United States.

2.2.5 Covered Services

The service package specified for the CNO consisted of two parts: mandatory services that had to be offered by the CNO in return for the premium paid, and a suggested set of optional services that individual CNO sites could choose to offer. The mandatory services were further clarified by contracts between HCFA and the four CNO sites to include:²

² Once the sites became operational, HCFA and the sites agreed on the final list of covered services. The original services mandated by OBRA differ slightly from those listed here.

- nursing care;
- home health services;
- rural health clinic services;
- physical, speech, and occupational therapy;
- medical social services;
- durable medical equipment and medical supplies other than drugs;
- ambulance services;
- services of a clinical psychologist;
- case management. This was defined as services that assist enrollees in gaining access to, and coordinating and approving utilization of, needed medical, social, educational and other services. In the CNO, this service must include providing an in-person assessment and updating the patient's care plan every six months. It also includes coordinating these services with other providers and monitoring the enrollee's progress toward the achievement of objectives specified in the patient's care plan.

2.2.6 Eligibility and Enrollment

With a few exceptions, any Medicare beneficiaries residing in defined areas close to the CNOs, who were entitled to benefits under Part A and were enrolled in Part B of Medicare, were eligible to enroll in the CNO. Those ineligible to enroll included beneficiaries enrolled in Medicare Risk HMOs, beneficiaries receiving care under the Medicare hospice benefit, and beneficiaries entitled to Medicare under the End Stage Renal Disease (ESRD) benefit.

During the operational phase of the demonstration, each CNO site was required to hold at least one open enrollment period when they would accept any eligible beneficiary who applied to participate. Those accepted were randomly assigned to treatment and control groups for the evaluation. (See Chapter 3 for details on randomization.)

CNO members were allowed to disenroll at the end of a calendar month for any reason. No enrollee could be forced to leave the CNO due to high service use. However, under the following conditions, a CNO was required to disenroll a member. These conditions were:

- failure to maintain enrollment in Parts A and B of Medicare,
- institutionalization for 60 or more consecutive days,
- enrollment in a Medicare Risk HMO,
- use of the Medicare hospice benefit,
- residence outside of the CNO service area for more than 30 consecutive days,
- persistent use of out-of-plan care for CNO mandatory services while enrolled in the CNO, or
- refusal of mandatory six-month assessment.

2.2.7 Determination of Capitation Rates and Case-Mix Adjustment

The CNOs received a monthly payment for each enrolled member. Payment amounts were based on the local average annual per capita cost of the Medicare-covered services that are part of the CNO's package. These rates in turn were adjusted for case mix as directed by OBRA. At all four sites,

enrollees were assigned to the appropriate payment rate cell according to their age, sex, and the number of Medicare-covered home health visits they had received in the previous six months. In three of the sites (AZ, MN, and NY) payment rates were further adjusted for the number of functional limitations in activities of daily living (ADLs) experienced by the enrollee. This resulted in a total of 39 rate cells for those three sites. Payments to the Carle Clinic (IL) site were not adjusted for ADL limitations and were based on 13 rate cells. Following each 6-month assessment by a CNO nurse, enrollees were re-assigned to the rate cell appropriate for their age, home health utilization, and (at three sites) number of ADL limitations.

In addition to the monthly capitated rate, the CNO sites received \$22 per member per month for case management services.

2.2.8 Timeframe

Sites began randomization and enrollment on December 17, 1993, with the expectation that the demonstration would last for three years. In 1996, the Health Care Financing Administration extended the CNO demonstration and evaluation for an additional year. The Balanced Budget Act of 1997 subsequently granted a further two-year extension for the project. The evaluation of the CNO demonstration, however, covered the four year period 1994-1997.

2.3 CNO Operations: Implementing the OBRA '87 mandate

Each site had considerable freedom in how it chose to organize itself. As long as the mandatory services were provided and the basic OBRA guidelines were followed, sites could individually determine the most efficient and productive ways to serve their members. Considerations addressed by each CNO included:

- their relationship with the sponsoring organization (how would the sponsor benefit from the CNO demonstration?);
- the optimal physical location for their sites;
- how to recruit members (what would appeal most to applicants in the local community?);
- how to maintain the financial viability of the project;
- how to define the roles of the Primary Nurse Providers and other staff members;
- how to coordinate the provision of services through physicians and contracted providers (since the CNO itself did not provide physical therapy, home health care, durable medical equipment, etc.);
- how to connect enrollees to available community services;
- how to standardize the authorization of services for enrollees; and
- how to encourage the continued participation of enrollees in the CNO.

Since the sites represent diverse locations and clienteles, they have responded in a variety of ways to these considerations. Below each CNO site will briefly be discussed, highlighting the manner in which it chose to fulfill the OBRA '87 mandate. Chapter 10 analyzes the sites' operations in more detail.

2.3.1 Carle Clinic CNO

Carle Clinic, the sponsoring organization for the Carle CNO, is a for-profit, private physician group practice with a large ambulatory nursing component. Serving nearly 2,500 patients daily, the Carle organizations act as the regional medical center for the primarily rural population of Central Illinois and Western Indiana. The Carle system is designed to provide primary care through a network of clinics, each using local community services and networking with local providers.

By mid-demonstration, the Carle CNO was operating 7 sites that served predominantly rural areas, with health services provided by 13 PNPs. Carle PNPs provided direct care and case management, and they tended to be paired with physicians or assigned to groups of physicians who provided a wide range of services, including services to non-CNO enrollees. PNPs who served higher-risk enrollees had smaller, more specialized caseloads than PNPs serving low-risk clients. By mid-demonstration, seven case assistants (CAs) supported the PNPs by doing administrative work and monitoring low-risk enrollees by telephone. Because of the rural clientele served by this CNO, the Carle PNPs relied more heavily on telephone monitoring of their patients than on in-person visits; there were also fewer opportunities to “drop in” here than at the other CNOs. Some of the contracted providers for the demonstration were affiliated with Carle while others were not.³

During the demonstration, managed care penetration in rural Illinois was low, and the independent, rural farming population served by Carle tended to view HMOs with suspicion.

2.3.2 Carondelet Health Care CNO

Carondelet Health Care (CHC), the sponsoring organization for the Carondelet CNO, is a Catholic, non-profit, full-service health care corporation that has operated in southern Arizona for 100 years. By mid-demonstration, the Carondelet CNO had 21 community sites that included senior centers, clinics, mobile home parks, and housing units. All of these sites were accessible to both CNO and non-CNO enrollees. The CNO utilized some of CHC’s nurse case managers, community health centers, outpatient services, and its home health agency. Most of the contracted providers for the demonstration were affiliated with CHC, although there were no formal relationships between PNPs and CHC physicians.

Two distinct types of nurses worked as PNPs: 1) nurse case managers, usually nurse practitioners, who traditionally worked with higher risk individuals who were hospitalized or home-bound; and 2) nurse partners, usually RNs, who worked in the community with lower risk individuals. If the low-risk clients moved into a higher risk category, they were assigned to a high-risk nurse case manager.

The Tucson area in which the Carondelet CNO operated was characterized by the most competitive managed care environment of the four sites. Several other managed care programs competed directly with the CNO. The area was also characterized by populations of retirees who, because of seasonal migration out of the service area, needed to be periodically enrolled and disenrolled.

3 “Contracted providers” refers to any agencies authorized by the CNO to provide direct health services to CNO enrollees, such as physical therapy, durable medical equipment, home health care, etc.

according to the rules of the CNO. In the latter part of the demonstration, the CNO expanded to include Hispanic populations in southern Arizona.

2.3.3 Living at Home/Block Nurse Program CNO

The Living At Home/Block Nurse Program Inc. (LAH/BNP) is a community-based initiative that was first piloted in St. Paul, MN in 1982 and has grown to have thirteen programs across Minnesota. The first program was started when community residents organized to care for the elderly in the community, implementing case management services for which there was no Medicare reimbursement. To set up the CNO, LAH/BNP formed a contractual relationship with HealthSpan, the largest Medicare certified home care agency in the state. HealthSpan provided the CNO with nursing staff, financial services, and home care services, as well as durable medical equipment. PNPs had to forge their own relationships with physicians in the community.

The CNO opened two rural and two urban sites, all of which served CNO enrollees exclusively. By mid-demonstration, eight PNPs were each assigned to one of the sites to provide direct care and case management services. Each nurse worked with a mixture of high- and low-risk individuals. The CNO incorporated the LAH/BNP principles of self-governance by community members, including an advisory committee and an emphasis on volunteers. Each CNO site employed a community coordinator to assist with non-health services and coordinate the volunteers. There are over 200 volunteers working for the sites, and more than 10 percent of them are CNO enrollees.

The Minneapolis/St. Paul area has been characterized by a high rate of managed care penetration, relative to the rest of Minnesota. However, the HMOs here are non-profit entities and not as competitive as those in the Tucson area, and HealthSpan is an experienced player in this kind of environment.

2.3.4 Visiting Nurse Service of New York (VNSNY) CNO

Visiting Nurse Service of New York is the largest non-profit Medicare-Certified Home Health Care Agency in the nation, providing more than 1.2 million professional visits annually to residents of New York City. By mid-demonstration, the VNSNY CNO had 28 urban sites, all in Queens, NY. Sites were located in various organizations, such as senior centers or housing units, that were accessible to both CNO and non-CNO enrollees. Each enrollee was assigned to one of the ten PNPs during the initial assessment, and for many enrollees, the PNP served as their main primary care provider. The PNPs carried a mixed caseload of high- and low-risk patients, and had "office hours" at the different sites during which enrollees could easily drop in.

VNSNY CNO enrollees tended to be older and sicker than enrollees at other sites. Many of them lived alone, and some had psychological problems, as in the case of enrollees who were Holocaust survivors. This CNO therefore had a heavier emphasis on psychological services than other sites. A member services assistant at the central office would identify community resources for enrollees, but PNPs had the main responsibility for referring enrollees to community services. The VNSNY CNO enrollees were reluctant to relinquish access to services that they believed they deserved or could obtain elsewhere. Physicians and other contracted providers, such as physical therapists, tended to

respond to this environment by being independent and competitive, presenting some challenges for the VNSNY CNO.

The New York City area has traditionally been resistant to managed care, in comparison to other parts of the state. During the demonstration, HMOs in the New York City area became increasingly interested in the use of mid-level and non-traditional providers that might appeal to a managed care-resistant population, but most of these initiatives appear to have been terminated for financial reasons.

3.0 The CNO Evaluation: Design and Analysis

The Community Nursing Organization (CNO) Demonstration was structured so that the impacts of the intervention could be readily measured. Implementation of any novel approach to health care delivery, however, is a dynamic process where theoretical design concepts must sometimes be altered to accommodate real-world constraints. HCFA, the sites, and the evaluation contractor have collaborated in an effort to balance any problems in implementation with the evaluability of the project. The compromises that have sometimes been necessary, and their implications for the evaluation, are discussed below.

In this chapter, we summarize aspects of the demonstration's design, sources and types of data, and analytic approach that are relevant to the analyses that appear in later sections of this report. The majority of this information was presented in previous reports, and is reproduced here with some modifications for completeness.

3.1 Experimental Design

In order to develop the most precise estimates possible of the impacts of the CNO intervention, the demonstration was structured as a social experiment: the experiences and outcomes of participants (the treatment group) were compared to those of a cohort that was alike in all ways except their exposure to the intervention (the control group). Given that participation in the CNO was voluntary, and the decision to apply was likely to be influenced by hard-to-measure factors that also influence health outcomes, the only way to create a valid control group was to do so *after* the decision to participate had been made. In other words, the subset of the Medicare population that wished to participate in the CNO was likely to differ from those who had no interest in joining the CNO; therefore only those who wished to participate could be compared. All applicants were randomly assigned to treatment or control status after the decision to apply had been made, a consent statement had been signed, and collection of baseline data had occurred.

The primary analytic strategy for evaluation of CNO effects is the "intent to treat" approach commonly employed in the analysis of clinical trials. This method estimates CNO effects through appropriate contrasts of the experience of individuals assigned to the treatment and control groups regardless of whether those assigned to the treatment group actually enrolled in the CNO. This procedure will dilute the estimated effect of the CNO (positive or negative) on measured outcomes, utilization, and Medicare outlays. However it avoids the bias likely to result if these same contrasts were carried out between CNO enrollees and members of the control group. The bias results because those individuals in the control group who would have either failed to enroll or enrolled and dropped out of the CNO had they been assigned to the treatment group cannot be identified. Therefore comparing *some* members of the treatment group (the enrollees) with *all* members of the control group produces an accurate estimate of CNO effects only if individuals drop out of the CNO completely at random, a most unlikely event.

To accommodate the program's need to build up enrollment quickly, random assignment was performed using a ratio of 2:1. Two applicants were assigned to the treatment group for every applicant assigned to the control group. This effective reduction in the size of the control group increased the minimum size of the impact that could be detected reliably. In determining a ratio for the

random assignment, the size of the impact that could be detected (and therefore the threshold for being considered a *significant* impact) was balanced against the sites' need to recruit more participants.¹

3.1.1 Implementation of Random Assignment

To avoid potential bias on the part of the CNO site staff who conducted baseline assessments, baseline data on the CNO applicants was collected *before* the applicants were randomized to treatment and control groups. Thus while they were implementing the baseline, the assessors did not know whether the applicant would in fact be able to enroll in the CNO. In order to facilitate and control the randomization process, Abt Associates developed a centralized CNO Random Assignment System (CNORAS) maintained at Abt Associates' offices in Cambridge, MA. After the baseline was performed, site staff "called in" via laptop computer and modem and entered basic data on each new applicant. The system assigned each applicant to the treatment or control group and gave a unique project identifier (the ABTID) to each applicant. Site staff copied down the ID and the assignment and entered it in site records. If an enrollee was already in the data base, the system indicated his or her existing ABTID and treatment/control assignment status.

Members of the same household who applied to the CNO were automatically assigned to the same treatment/control status. This was done to avoid problems in service delivery within the household and the likelihood of control group members benefiting from CNO services provided to treatment group members in the same household. To facilitate this assignment, site staff identified the potential eligible members of each applicant's household; these were termed Qualified Household Members (QHMs). Data on all QHMs were entered into the CNORAS, even if they were not applying to the CNO. QHMs who later decided to apply would hence automatically be assigned to the proper group.² This led to a slight increase in the ratio of treatments to controls, since Qualified Household Members of control group members would not have bothered applying to the CNO.

3.1.2 Special Situations

The original specifications for the implementation of random assignment called for the following sequence. First, the beneficiary would be recruited by the site and sign an informed consent form accepting participation in random assignment. Then collection of baseline assessment and other data for the evaluation would occur. The randomization assignment would finally be requested from Abt Associates; control group members would be informed of their status and have no further contact with the CNO, while treatment group members would be enrolled, receive a clinical assessment, and begin to receive CNO services. In practice, this sequence was not universal. The most frequent exceptions are described below.

1 For example, it was estimated that an assignment ratio of 2:1 meant that an 8 percent reduction in the rate of inpatient admissions could be detected with statistical power of .71 (at a .10 significance level), assuming total enrollment of 4,800 (3,200 in the treatment group and 1,600 in the control group). Allocating to treatment and control groups using a 1:1 ratio would have allowed a smaller impact to be detected with comparable power, but would have required the sites to have been satisfied with 2,400 treatment participants or to have recruited a larger total number of applicants to yield the same number of enrollees (3,200).

2 The system allowed site staff to link each applicant with one QHM, which covered the vast majority of situations encountered. Occasionally, an applicant had multiple QHMs. These were reported to Abt on a case-by-case basis, and Abt staff established the link in the CNORAS manually.

- **Randomization before baseline assessment.** Three of the four sites lacked laptop computers that would allow staff to call in to CNORAS from applicants' homes. At the outset, site staff protested that it was awkward and inefficient to conduct a baseline assessment, leave and obtain the random assignment, and return at some later date to perform a clinical assessment and develop a care plan for treatment group members. Eventually, it was agreed that CNO office staff could call in to CNORAS for cases that were to be assessed that day, obtain the assignments, conceal them in an envelope, and provide them to the assessment nurse. Once the baseline assessments were completed, the nurse could reveal the random assignment. If the applicant was assigned to the control group, the nurse would thank them and leave; if assigned to the treatment group, she could continue with the enrollment and care planning process.
- **Randomization without baseline assessment or enrollment:** There were some situations where beneficiaries were randomly assigned but never received a baseline assessment, or were assigned to treatment status but never enrolled in the CNO. This would include cases where the beneficiary changed his/her mind about participation after being randomized; where the site assigned the beneficiary to treatment or control status before s/he had agreed to participate; where the beneficiary was determined to be ineligible for the CNO after being randomized; and where the beneficiary died before baseline or enrollment. These cases were relatively rare, but they do occupy "slots" in the CNORAS, and may therefore cause the analysis samples to depart from the 2:1 ratio. Treatments and controls who received no baseline assessment could not receive follow-up assessments from Abt Associates.
- **Contaminated Controls:** In several instances, beneficiaries who were randomly assigned to the control group were inadvertently enrolled in the CNO and received the same services as a member of the treatment group. To preserve the validity of the experiment, these cases were nonetheless analyzed as Controls.
- **Hiatus in randomization to the control group:** The CNO Evaluation was originally scheduled to end on December 31, 1995. Starting October 1, 1995, all new applicants were "randomized" to the treatment group, since no follow-up assessments allowing comparisons between treatments and controls would have been performed on applicants randomized after that date. In early 1996 HCFA modified the original contract allowing the evaluation to continue for another year. At that point in time, it was decided that the pool of control group members was already sufficiently large and that randomizing a small number of new controls would contribute little to the analysis. Throughout 1996, new members continued to be randomized to the treatment group. However, when the contract was again extended for two more years, the randomization of new applicants to both treatment and control groups was renewed. Overall, the hiatus in randomization to the control group lasted from October 1995 through December 1996. As a result, all 1,144 CNO applicants during that time period were enrolled as treatments, and the ratio of treatments to controls is slightly greater than 2:1.

3.2 Person-Level Samples for the Analysis on This Report

Analytic files were constructed for two categories of people: CNO applicants assigned to the treatment (CNO) group and CNO applicants assigned to the control group.

3.2.1 CNO Applicants: Treatment Group and Control Group

CNO applicants were randomized between December 17, 1993 and October 2, 1997. There are 13,856 entries in the Random Assignment file within this date range, although some of these entries were errors and do not reflect actual applicants. The treatment group consists of 9,691 entries (70 percent); the control group consists of 4,165 entries (30 percent). All analyses in this report use the number of months that have elapsed since the date of randomization as the measure of exposure to the CNO 'effect.' For each applicant, the date of randomization is considered to be their 'anchor' date.

Table 3.1 below shows the number of beneficiaries in the treatment group and control group by CNO site.

Table 3.1: Assignment to Treatment and Control Groups by Site

| | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|------------------------------------|----------------------|--------------------|----------|----------|--------|
| Number of Treatments | 2,536 | 3,217 | 2,064 | 1,874 | 9,691 |
| <i>As percentage of site total</i> | 69% | 69% | 69% | 73% | 70% |
| Number of Controls | 1,135 | 1,417 | 912 | 701 | 4,165 |
| <i>As percentage of site total</i> | 31% | 31% | 31% | 27% | 30% |
| Total | 3,671 | 4,634 | 2,976 | 2,575 | 13,856 |

Sources: Abt Associates Analytic Files, HCFA Enrollment Database.

Percentages listed represent the relative allocation of applicants to treatment and control groups, by site. By design, the sites would have recruited 67 percent treatments and 33 percent controls. However, the provision for Qualified Household Members (see section 3.1.1 above) as well as the hiatus in randomization to the control group (see section 3.1.2 above) led to a higher overall ratio of treatments to controls (70 percent versus 30 percent). VNSNY deviated the most from the original goal, assigning 73 percent of applicants to the treatment group and 27 percent to the control group.

3.2.3 Sub-samples considered for the analyses

Different samples and sub-samples were considered in the various analyses included in this report. In order to come to conclusions that would be the most accurate and have the greatest statistical and explanatory power, it was important to carefully choose appropriate segments of the CNO populations based upon the focus of particular analyses. Below we compare the different samples used in each chapter.

Chapter 4

In the CNO Enrollment and Disenrollment all individuals randomized from January 1994 through September 1997 to the treatment and control groups were included, with the one exception of individuals who were assigned certain "error codes." These codes signified that errors were made

during the randomization process (for instance, the same person was randomized twice: individuals who did not exist were randomized; or individuals who were in fact ineligible for the CNO were accidentally randomized). The codes also indicate whether an individual randomized to the Control Group actually enrolled in the CNO, and whether an individual randomized to Treatment never enrolled. In the case of faulty randomization codes, we analyzed the individual based on the original code assigned, not based on whether or not they actually enrolled.

Chapters 5 and 6

The chapters on *Outcomes: Health, Mortality and Functioning and Satisfaction and Preventive Care* are based on comparisons between baselines and follow-up assessment data. CNO Treatments and Controls who were randomized between December 1993 and September 1995 were considered for these analyses. The great majority of Treatments and Controls were randomized during this time period, and all would have been eligible to receive at least two follow-up assessments. We excluded individuals who did not receive a baseline assessment, since it would have been impossible to track changes in their health status and satisfaction over time.

In addition, two subsamples of the above group were studied. First, the "Intent-to-Treat" subsample follows the strict definition of a classical experiment: those individuals randomized to the treatment group were analyzed as Treatments, regardless of whether they were actually enrolled in the CNO at any particular point in time, and those randomized to the control group were always considered Controls. Thus an individual who voluntarily disenrolled from the demonstration would still be considered part of the Treatment group, even though she was no longer benefiting from CNO services. Likewise, individuals with faulty randomization codes were analyzed according to the original code assigned, not according to whether they actually received services from the CNO. The strength of this sample is that it maintains the purity of the Treatment and Control groups – it accounts for possible selection bias among Treatments who might have disenrolled because they were unhappy with the services (or lack of services) provided by the CNO.

The second subsample is the "Actually Treated" sample, which looks at Treatments who were currently enrolled in the CNO at the time of each assessment and *had been continuously enrolled up until that assessment*. If a Treatment disenrolled from the CNO, all future assessments were excluded from the analysis. The control group was also limited; any Control who at the time of assessment would have been ineligible for the CNO (had he or she been a treatment group member) was excluded from the sample from that point forward. This was determined by reviewing Medicare records and includes those who became ineligible due to End Stage Renal Disease (ESRD), admission to a hospice, or residence in a Skilled Nursing Facility (SNF) for more than 60 days. The advantage of this subset is that it maximizes the possibility of detecting a treatment effect if one exists. However, if an effect is detected, we cannot determine whether it resulted from treatment or from selection bias.

Chapters 7 and 8

The chapters on *Utilization of Health Care and Medicare Outlays*, which compare how CNO Treatments and Controls utilized CNO and non-CNO services, as well as how much these services cost Medicare, also consider individuals randomized between December 1993 and September 1995. Again, the sample of demonstration participants within this timeframe was seen as the best trade-off between a larger sample of people who had been in the CNO only for a short time, and a smaller sample of people who had been in the CNO for a long time. Service utilization and Medicare expenditures data were analyzed for the 25 months before and 36 months after each randomization, up

to a cutoff date of September 1997. Individuals without a baseline were not analyzed. Since the data were organized by month, it was possible to exclude individual records from particular months when beneficiaries were ineligible for the demonstration. Thus, individual records from months when a beneficiary was under 65, enrolled in an HMO, or ineligible for part A or B of Medicare were excluded from the analysis in these two chapters.

As in chapters 5 and 6, two subsets of this sample were compared. The “Intent-to-Treat” sample follows the definition listed above, analyzing all those randomized to the treatment and control groups, regardless of whether they were actually enrolled at any particular point in time. The “Actually Treated” sample takes records from the months during which the Treatments were actually enrolled in the CNO, and excludes individual records from months where they had voluntarily or involuntarily disenrolled. Controls in this subsample consist of those randomized to the control group, excluding records from the months when they were ineligible for the CNO due to ESRD, admission to a hospice, or residence in an SNF for more than 60 days.

3.3 Data Sources for the Quantitative Evaluation

Data for the analyses appearing in this report come from five sources: 1) Medicare enrollment and claims files from HCFA, 2) CNO Enrollment Files, 3) baseline questionnaire responses, 4) follow-up surveys conducted by Abt Associates, and 5) CNO site data (including nurse timesheets and service utilization by enrollees).

For members of both the treatment and control groups, Medicare claims files provide information on the use of services that are *not* part of the CNO package – for instance, physician, and hospital services. For members of the control group, Medicare claims files also provide data on the use of services that *are* part of the CNO package, but that control group members receive through fee-for-service Medicare. Data on utilization of CNO-covered services by treatment group members are based on files constructed by each of the four sites.

In order to measure the effects of the CNO intervention across all four CNO sites consistently, it was necessary for Abt to collect data on client health and functioning directly from beneficiaries. As outlined above, baseline data on client health and functioning were collected by CNO staff, usually before assignment to the treatment and control groups. Follow-up data were collected annually by Abt telephone interviewers. Data elements in the baseline and follow-up survey questionnaires included satisfaction with care, current level of physical functioning, number and severity of health problems, and out-of-pocket expenditures for health care not covered by Medicare or by the CNO.

3.3.1 Medicare Data Sources

Medicare service utilization and eligibility information was obtained from databases maintained by HCFA. The National Claims History Database (NCH) contains Part A and Part B claims records, including line item information on all services provided, for all claims since October 1, 1990. To analyze each beneficiary’s utilization of Medicare services, we collected the following information from the Inpatient/Skilled Nursing Facility (SNF), Outpatient, Home Health Agency (HHA), Hospice, and Physician/Supplier claims files for all randomized beneficiaries:

Table 3.2
Summary of Samples for the Analyses, by Chapter

| Chap. | Includes individuals randomized between (dates): | Data collected from (date) to (date): | Total Sample Excludes: | "Intent-to-treat" Subsample | "Actually Treated" Subsample | |
|-------|--|---------------------------------------|---|---|--|---|
| | | | | Includes: | Includes: | Excludes: |
| 4 | 12/93-9/97 | 12/93-8/98 | •Individuals with certain error codes | N/A | N/A | N/A |
| 5 | 12/93-9/95 | 12/93-12/97 | •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment & continuously enrolled in CNO •All those randomized to Control who would have been eligible for the CNO | •Treatments who never enrolled •Treatments after they disenrolled •Controls after they became ineligible (ESRD, hospice, SNF) |
| 6 | 12/93-9/95 | 12/93-12/97 | •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment & continuously enrolled in CNO •All those randomized to Control who would have been eligible for the CNO | •Treatments who never enrolled •Treatments after they disenrolled •Controls who became ineligible (ESRD, hospice, SNF) |
| 7 | 12/93-9/95 | 12/91-9/97 | •Records for months when individual was under 65, enrolled in HMO, or ineligible for Medicare part A or B •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment during the months when they were actually enrolled •All those randomized to Control during the months when they would have been eligible for the CNO | •Treatments who never enrolled •Treatments during the months when they were disenrolled •Controls during the months when they would have been ineligible for the CNO (ESRD, hospice, SNF) |
| 8 | 12/93-9/95 | 12/91-9/97 | •Records for months when individual was under 65, enrolled in HMO, or ineligible for Medicare part A or B •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment during the months when they were actually enrolled •All those randomized to Control during the months when they would have been eligible for the CNO | •Treatments who never enrolled •Treatments during the months when they were disenrolled •Controls during the months when they would have been ineligible for the CNO (ESRD, hospice, SNF) |

Sources: Abt Associates Inc.

- beneficiary identification numbers (Medicare health insurance claim numbers (HICN))
- provider identification numbers
- dates of service
- type of claims (inpatient/SNF, outpatient, HHA, hospice, physician supplier, etc.)
- units of service
- submitted charges
- allowed charges
- reimbursement amount
- coinsurance and deductible amounts
- type of service codes
- place of service codes
- diagnosis codes
- procedure codes

Claims records were collected for the two years prior to each applicant's random assignment to the treatment or control group³ and up to 45 months following assignment.

The HCFA Enrollment Database (EDB) contains a few demographic data elements as well as the entitlement status of all Medicare beneficiaries, information necessary for determining beneficiaries' eligibility for this demonstration. Most of the information on the EDB is also available through the HCFA Health Insurance Skeleton Eligibility Write-Off (HISKEW) file, which has been produced from the EDB since January 1992. The HISKEW file was used to verify the Medicare status of individuals who might be eligible to participate in the demonstration. It provided the following types of information about Medicare enrollees:

- identification numbers (Medicare HICN)
- demographic information (date of birth, sex, race, state, county, zip code)
- date of death
- Medicare Part A entitlement and/or Part B enrollment and termination dates
- End Stage Renal Disease (ESRD) entitlement
- disability entitlement

It was necessary to access the EDB to obtain beneficiary names, and the HCFA Group Health (GHPMASTER) File to obtain dates of HMO enrollment (if any), since these pieces of information were not available from HISKEW. Similarly, the HCFA Hospice Enrollment File was used to identify the periods during which a beneficiary was in a Medicare hospice.

3.3.2 The CNO Enrollment Files

These files were maintained by HCFA to determine whether a CNO applicant was eligible for the demonstration, and to track which CNO Treatments were currently eligible for the CNO, as well as how many individuals were actually enrolled at each CNO site, by month. Sites were expected to verify whether an applicant was eligible by calling a designated HCFA staff person before randomization. The enrollment files allowed HCFA to keep accurate eligibility records, and were necessary for HCFA to properly reimburse the CNOs each month.

³ With the exception of those assigned in December 1993, for whom 23 months of baseline data were available.

3.3.3 Baseline and Follow-up Assessment Data

A comprehensive basic assessment tool was developed to capture baseline and follow-up data on functional status, satisfaction with health care, utilization, out-of-pocket cost of services, and selected demographic data. The basic instrument has six components:

- **Personal Background and Health History.** Personal background information includes age, gender, education, income, health insurance, and family situation data.
- **The Short Form Health Survey (SF-36) and Quality of Life Measures.** The Short Form Health Survey (SF-36), developed as part of the Medical Outcomes Study (Ware & Sherbourne, 1992), measured individuals' judgments about their well-being, energy level, and limitations in social, physical, and role activities, as well as their perceived health status.
- **The Health Risk Appraisal.** The Carter Center Health Risk Appraisal Instrument identified precursors of serious illness. Individual health behaviors and personal characteristics were used to calculate probability of dying in the next ten years from 42 causes of death. The computation was based on mortality statistics and epidemiological data. The Carter Center instrument included items relating to nutrition, smoking, alcohol use, seat belt use, mammograms, recent personal loss, and awareness of blood cholesterol and blood pressure.
- **Functional Status (ADLs, IADLs).** The Functional Status interview collected data on activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Portions of the CNO functional status items were identical to those used in the National Long-Term Care Survey, to allow comparisons between the CNO groups and national samples. Questions in the ADL portion of the interview focused on whether or not the enrollees had problems performing routine self-care tasks or moving about independently, if they had received human help in the past week, if they thought they got enough help, and the length of time they had had any of the problems. The IADLs portion of the interview addressed the participant's ability to carry out routine chores such as meal preparation, housework, and money management.
- **Pfeiffer Short Portable Mental Status Questionnaire (SPMSQ).** The SPMSQ is a 10-item, easily-administered instrument that provides quantitative results and a straightforward interpretation for clinically significant organic brain syndromes in the elderly. The ten items include questions regarding clients' orientation, recall, and cognitive ability. Scoring was based on the sum of incorrect responses.
- **Participant Service Utilization and Satisfaction Survey.** The CNO Participant Service Utilization and Satisfaction Survey was adapted from the Center for Governmental Research Inc. Independent Living for Seniors Satisfaction Survey, and was used to measure health care service use and patients' satisfaction with the delivery of these services. The

survey did not elicit any information concerning specific services or referrals provided by the CNO so that it could be administered to both the treatment and control groups.

In addition, during the first year of the contract, data on nursing diagnoses and outcomes were collected from a random sample of 20 percent of the applicants during baseline assessment. The Omaha System (Martin & Scheet, 1988; Martin, Leak & Aden, 1992; Martin & Scheet, 1992) instrument was selected with mutual agreement by Abt and the CNO sites. This problem classification scheme identifies 45 problems which are mutually exclusive and are organized into four domains:

- environmental
- psychosocial
- physiological
- health behaviors

The assessor would identify the presence or potential for each problem and rate the problem on three dimensions: knowledge, behavior, and status. The three dimensions were then rated on a five-point Likert scale. Based on the problem identification, appropriate care and services could be provided to the CNO treatment group.

Assessments were first conducted by CNO site staff at baseline. Follow-up assessments were conducted on an annual basis by telephone interviewers at Abt Associates' telephone survey center. Wave 1 Follow-Ups were scheduled for 15 months following randomization to avoid overlap with the sites' required reassessment of all treatment group members at 12 months following enrollment. Wave 2 Follow-Ups occurred at 27 months following randomization, and, if the applicant had been enrolled long enough, Wave 3 Follow-Ups occurred at 39 months after randomization.

1997 Contract Modification to the Follow-up Assessment Process

In 1997, the CNO Evaluation contract was extended and modified. One significant modification was the decision not to perform a Wave 2 Follow-up Assessment on the cohort of CNO Treatments who 1) had fewer than two functional limitations (ADLs or IADLs), and 2) had been randomized after September 1994. It was decided that these low-risk enrollees were unlikely to show significant changes in their health status from one follow-up to the next. Since the Wave 2 Assessment was both resource-intensive for Abt Associates and intrusive for the enrollees, it was dropped for this particular group. However, any enrollee who had been randomized between December 1993 and September 1994 continued to receive assessments, in order to ensure that one group would be subject to continuous analysis. Telephone follow-up continued for enrollees with two or more functional limitations.

3.3.4 CNO Site Data

Because the CNOs received capitation payments and did not submit Medicare claims for care provided under their service package, each site had to establish demonstration-specific systems to collect service utilization data and submit the data to Abt Associates. HCFA allowed each CNO to develop the data collection system best suited to the particular circumstances of the site. These data were to be used to compare the use of CNO-covered services by enrollees with the use of these services by non-CNO Medicare beneficiaries. In practice, the inconsistencies between each site's data collection system made comparison somewhat challenging. We have attempted to combine the data in a comparable fashion for this analysis.

The CNO sites agreed to collect two types of service data to document the volume and types of services they provide to CNO enrollees. These were:

- Primary Nurse Provider (PNP) time sheets, to document the volume and type of direct and indirect services provided to enrollees by PNPs, and
- Service Utilization Data, intended to document other (non-PNP) services provided to enrollees by the CNO. These services included those provided by the CNO's contracted providers, such as durable medical equipment, home health care, physical therapy, and psychological counseling.

PNP Timesheets

The PNP timesheets captured data on the time spent by nurses on CNO activities. They were focused on associating nurse time with individual enrollees in order to facilitate direct analysis of the impact of nurse interventions on enrollee health outcomes. Each period of time spent by a PNP with an enrollee could be broken down into a series of beneficiary/service "bills." The basic unit was the time that a PNP spent providing a single service to an enrollee on a single day. For each service delivered, the following information was required:

- Primary Nurse Provider's identification code;
- type of service provided (home contact, CNO site contact, institutional contact, telephone contact, physician or other provider contact, meetings, or documentation and paperwork);
- type of intervention (assessment, teaching, psychosocial care, physical care, or coordination/ management);
- up to two related Omaha problems (see discussion of the Omaha Nursing Diagnosis System in section 3.3.3 above);
- time spent, in 5-minute increments;
- enrollee's ABTID; and
- date of service.

PNPs also reported data on time spent in non-enrollee-specific CNO activities, such as group activities, meetings, and marketing.

Although as mentioned above the sites were given latitude in configuring these items into their existing procedures, the sites were not entirely successful in reporting all of the core data items required by Abt Associates.

Service Utilization Data

Service Utilization Data was intended to document the services delivered to enrollees by the CNO. Since most sites contracted with other agencies for most of the non-PNP services (for instance, physical therapy, home health care, or durable medical equipment), much of the service utilization data were already available from contractors' billing records and other existing data systems. Because site circumstances varied so widely, Abt Associates again allowed the sites develop individual formats for these data submissions, while requiring that certain core data items be reported:

- enrollee ABTID;
- Primary Nurse Provider's Identification Code;
- place of service (home, CNO site, institution, other);

- date of service;
- type of service (HCPCS code, HHA revenue code, etc.);
- quantity of service (minutes/hours, pieces of equipment, etc.)
- Omaha problems being addressed or diagnosed.

Again, the sites were not successful at collecting and reporting data on all of these items, though basic data on the volume of service provided is available from all sites. Reporting on the provision of durable medical equipment (DME) presented special difficulties. The CNOs often re-used pieces of equipment; however, there would be no new billing record for the provision of used equipment, and thus the service provision was difficult to track.

3.3.6 Summary Table of Data Sources

Table 3.2 below presents a summary of the type and sources of data for treatment and control group members that are used in this report. Using all of these data, a variety of files were constructed for the analyses which appear in subsequent chapters of this report.

Table 3.2: Summary of Data by Sources

| | HCFA | | | CNO | | | Abt |
|-----------|---------------------------------------|----------------|---------------|---------------------|-----------------|---------------------|----------------------|
| | Medicare Service Utilization (Claims) | CNO Enrollment | Medicare EDB* | Baseline Assessment | PNP time-sheets | Service Utilization | Follow-up Assessment |
| Treatment | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control | ✓ | | ✓ | ✓ | | | ✓ |

*Enrollment Data Base

3.3.7 Analytic Files Constructed for the Evaluation

The following analytic files were constructed for the final evaluation:

- **CNO Master File.** This file was drawn from Abt Associates' randomization program (CNORAS) and the CNO Enrollment file maintained by HCFA. It lists all of the CNO Treatment and Control Group members, and gives an overview of each beneficiary's history with the CNO. Enrollment and disenrollment dates, rate cells, and dates of 6-month reassessments are included, as is a code listing whether baseline and follow-up assessments were completed. In addition, "error codes" assigned to each beneficiary are listed, indicating whether the site made errors during the randomization process. When linked with other files for analysis, these erroneous records could be selectively eliminated as desired.
- **CNO Eligibility Files.** These files were constructed from Medicare's Enrollment Database and listed the eligibility dates for each Treatment and Control. Each record is at the beneficiary-month level and thus can show changes in eligibility over time.
- **Rate Cell File.** Based on the CNO Enrollment Files kept by HCFA, this file lists the rate cell each beneficiary was assigned to during a particular month of the demonstration.

- **Baseline Assessment Files.** Baseline files were constructed using files sent to Abt Associates by each site. There is one record for every Treatment and Control, and missing values for those randomized who never received a baseline.
- **Follow-up Assessment File.** One follow-up assessment file was constructed based on data from all four sites. The cumulative results of all completed surveys for each Treatment and Control are listed.
- **Time Allocation File.** Constructed from on the PNP timesheet data, this file has one record for each site by month, for a total of 178 records. All services that nurses performed at a CNO during a particular month were summed together.
- **CNO Utilization File.** This file is based on Service Utilization data received from the sites and contains one record per CNO Treatment and Control, by month.
- **Medicare Utilization Files.** A file for CNO Treatments and Controls was constructed based on Medicare Service Utilization (Claims) data. The file is at the person level, and contains data aggregated by month. For comparative purposes, data were also collected for the 24 months preceding an individual's randomization.

3.4 Response Rates to Baseline and Follow-up Assessments

Table 3.3 outlines the completion rate of baseline assessments, as a percentage of the total number of applicants randomized to the treatment and control groups during the evaluation (December 1993 through October 1997):

Table 3.3: Number of Baseline Assessments Completed and Baseline Response Rates

| | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|----------------------|--------------------|----------|----------|--------|
| Treatment | 2,308 | 2,935 | 1,949 | 1,557 | 8,749 |
| <i>As percentage of total applicants randomized to treatment group</i> | 91% | 91% | 94% | 83% | 90% |
| Control | 1,000 | 1,322 | 868 | 594 | 3,784 |
| <i>As percentage of total applicants randomized to control group</i> | 88% | 93% | 95% | 85% | 91% |
| Total | 3,308 | 4,257 | 2,817 | 2,151 | 12,533 |
| <i>As percentage of total randomized applicants</i> | 90% | 92% | 95% | 84% | 90% |

Source: Abt Associates Inc

The effectiveness of the sites in completing baselines ranged from 84 percent at VNS to 95 percent at LAH. Although baseline assessments should have been performed before randomization to the treatment and control groups, and thus all those randomized should have a baseline, it is clear that in a number of cases randomization happened first (see discussion in section 3.1.2 above). When randomization did occur first, several reasons may explain why no baseline was performed. First, it was possible that a randomized applicant would change his or her mind before the baseline was performed and decide not to participate in the demonstration. Also, some applicants died before baselines could be performed, and in some cases baselines were started but not completed.

Table 3.4 shows the completion rates for the Wave 1 Follow-up Assessments, performed by Abt Associates on both treatment and control group members 15 months after randomization.

Table 3.4: Number of Enrollees within the Wave 1 Follow-up Assessment Timeframe

| | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|----------------------|--------------------|----------|----------|--------|
| Treatment | 2166 | 2504 | n =1793 | 1449 | 7912 |
| <i>As percentage of total applicants randomized to treatment group</i> | 85% | 78% | 87% | 77% | 82% |
| Control | 1014 | 1203 | 870 | 655 | 3742 |
| <i>As percentage of total applicants randomized to control group</i> | 89% | 85% | 95% | 93% | 90% |
| Total | 3180 | 3707 | 2663 | 2104 | 11,654 |
| <i>As percentage of total randomized applicants</i> | 86% | 80% | 89% | 82% | 84% |

Source: Abt Associates Inc.

In order for enrollees to be eligible for a Wave 1 Follow-up Assessment, their randomization date must have been at least 15 months before the end of the demonstration (December 1997). Thus any applicant randomized between September 1996 and December 1997 would not have been eligible to receive a first follow-up. Of the total number ever randomized, 84 percent were within the Wave 1 timeframe.

Table 3.4 Continued: Wave 1 Follow-up Assessment Response Rates

| Attempted Wave 1 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|---|----------------------|--------------------|----------|----------|--------|
| Treatment | 1938 | 2095 | 1610 | 1104 | 6747 |
| <i>As percentage of those within the Wave 1 timeframe</i> | 89% | 84% | 90% | 76% | 85% |
| Control | 904 | 1106 | 794 | 558 | 3362 |
| <i>As percentage of those within the Wave 1 timeframe</i> | 89% | 92% | 91% | 85% | 90% |
| Total | 2842 | 3201 | 2404 | 1662 | 10,109 |
| <i>As percentage of those within the Wave 1 timeframe</i> | 89% | 86% | 90% | 79% | 87% |
| Completed Wave 1 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1742 | 1887 | 1491 | 838 | 5958 |
| <i>As percentage of attempted Wave 1 follow-ups</i> | 90% | 90% | 93% | 76% | 88% |
| Control | 797 | 877 | 671 | 313 | 2658 |
| <i>As percentage of attempted Wave 1 follow-ups</i> | 88% | 79% | 85% | 56% | 79% |
| Total | 2539 | 2764 | 2162 | 1151 | 8616 |
| <i>As percentage of attempted Wave 1 follow-ups</i> | 89% | 86% | 90% | 69% | 85% |

Source: Abt Associates Inc

We attempted to reach a total of 87 percent of CNO Treatments and Controls who were within the timeframe to receive a Wave 1 Follow-up. Several reasons account for the thirteen percent who were never attempted. Some individuals had died; others had become ineligible for the demonstration because they had joined an HMO or were receiving hospice care. Individuals who had never received a baseline assessment were not called for any follow-ups. Some CNO treatments and controls wrote or called Abt Associates specifically to request that they not be called, and we respected their wishes. Finally, during the months of December 1996 through February 1997, there was some uncertainty regarding the continuation of the evaluation. Since the survey process would originally have ended in December 1996, surveying efforts temporarily ceased until the decision was made to continue the evaluation.

We were able to obtain completed Wave 1 Follow-up surveys from 88 percent of the Treatments and 79 percent of the Controls who were called. There are several reasons why interviews might not have been completed: the individual refused to participate or broke off the interview before completion; the interviewer was unable to reach the enrollee after numerous attempts; or a language barrier prevented completion. As would be expected, completion rates were slightly higher for Treatments than for Controls, the latter being more likely to refuse to participate in the phone interview as they were not benefiting from CNO services. LAH participants had the highest completion rate (90 percent) while we were least likely to obtain a completed first follow-up assessment from VNSNY participants (69 percent).

Table 3.5 shows Wave 2 Follow-up Assessment response rates. Wave 2 Follow-ups were implemented 27 months after randomization.

| No. of Enrollees Within the Wave 2 Follow-up Assessment Timeframe | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|--------------------------|------------------------|-----------------|-----------------|--------------|
| Treatment | 2160 | 2491 | 1786 | 1433 | 7870 |
| <i>As percentage of total applicants randomized to treatment group</i> | 85% | 77% | 87% | 76% | 81% |
| Control | 1013 | 1202 | 870 | 655 | 3740 |
| <i>As percentage of total applicants randomized to control group</i> | 89% | 85% | 95% | 93% | 90% |
| Total | 3173 | 3693 | 2656 | 2088 | 11,610 |
| <i>As percentage of total randomized applicants</i> | 86% | 80% | 89% | 81% | 84% |
| Attempted Wave 2 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1415 | 809 | 755 | 707 | 3686 |
| <i>As percentage of those within the Wave 2 timeframe</i> | 66% | 32% | 42% | 49% | 47% |
| Control | 689 | 407 | 385 | 366 | 1847 |
| <i>As percentage of those within the Wave 2 timeframe</i> | 68% | 34% | 44% | 56% | 49% |
| Total | 2104 | 1216 | 1140 | 1073 | 5533 |
| <i>As percentage of those within the Wave 2 timeframe</i> | 66% | 33% | 43% | 51% | 48% |

| Completed Wave 2 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|---|-------------------|-----------------|----------|----------|-------|
| Treatment | 1254 | 628 | 652 | 500 | 3034 |
| <i>As percentage of attempted Wave 2 follow-ups</i> | 89% | 78% | 86% | 71% | 82% |
| Control | 594 | 282 | 329 | 171 | 1376 |
| <i>As percentage of attempted Wave 2 follow-ups</i> | 86% | 69% | 85% | 47% | 74% |
| Total | 1848 | 910 | 981 | 671 | 4410 |
| <i>As percentage of attempted Wave 2 follow-ups</i> | 88% | 75% | 86% | 63% | 80% |

Source: Abt Associates Inc

In order for CNO members to be eligible for Wave 2 Follow-ups, they had to have been randomized by September 1995. Of the total number of individuals ever randomized, 84 percent were within this timeframe.

The number of individuals whom Abt Associates attempted to reach for a second follow-up dropped sharply during Wave 2: forty-eight percent of those within the timeframe for Wave 2 were attempted for a Wave 2 Follow-up. This drop can be explained by the January 1997 modification to the CNO Evaluation contract, which was discussed above (see Section 3.3.3). As a result of this modification, any individual randomized after September 1994 who had fewer than two ADL or IADL limitations was not called for a Wave 2 Follow-up. A large percentage of CNO Treatments and Controls were relatively healthy and had few functional limitations, and therefore would not have been called for a second follow-up. Other reasons why Abt Associates did not attempt to complete Wave 2 Follow-ups include those outlined for Wave 1 above: individuals had died, became ineligible by joining an HMO or entering a hospice, or requested not to be called. The hiatus in survey efforts between December 1996 and February 1997 also meant that a small number of interviews were never attempted.

We were able to complete Wave 2 Follow-up Assessments for 80 percent of the Treatments and Controls who were called. This shows a slight decrease from the completion rate of Wave 1 Follow-ups, most likely because individuals were becoming less interested in repeating a lengthy phone survey after 27 months of participation in the demonstration. Carle Clinic Treatments and Controls showed the highest completion rate (88 percent) while only 71 percent of VNS Treatments and 47 percent of VNS Controls completed Wave 2 Follow-ups.

Table 3.6 lists response rates for the final Wave 3 Follow-up Assessments. These were performed 39 months after randomization.

Table 3.6: Wave 3 Follow-up Assessment Response Rates

| No. of Enrollees Within the Wave 3 Follow-up Assessment Timeframe | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|-------------------|-----------------|----------|----------|-------|
| Treatment | 1517 | 787 | 712 | 901 | 3917 |
| <i>As percentage of total applicants randomized to treatment group</i> | 60% | 24% | 35% | 48% | 40% |

| | | | | | |
|--|--------------------------|------------------------|-----------------|-----------------|--------------|
| Control | 755 | 348 | 336 | 417 | 1856 |
| <i>As percentage of total applicants randomized to control group</i> | 67% | 25% | 37% | 59% | 45% |
| Total | 2272 | 1135 | 1048 | 1318 | 5773 |
| <i>As percentage of total randomized applicants</i> | 62% | 24% | 35% | 51% | 42% |
| Attempted Wave 3 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1258 | 553 | 548 | 572 | 2931 |
| <i>As percentage of those within the Wave 3 timeframe</i> | 83% | 70% | 77% | 63% | 75% |
| Control | 606 | 268 | 270 | 299 | 1443 |
| <i>As percentage of those within the Wave 3 timeframe</i> | 80% | 77% | 80% | 72% | 78% |
| Total | 1864 | 821 | 818 | 871 | 4374 |
| <i>As percentage of those within the Wave 3 timeframe</i> | 82% | 72% | 78% | 66% | 76% |
| Completed Wave 3 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1059 | 399 | 466 | 381 | 2305 |
| <i>As percentage of attempted Wave 3 follow-ups</i> | 84% | 72% | 85% | 67% | 79% |
| Control | 479 | 178 | 212 | 140 | 1009 |
| <i>As percentage of attempted Wave 3 follow-ups</i> | 79% | 66% | 79% | 47% | 70% |
| Total | 1538 | 577 | 678 | 521 | 3314 |
| <i>As percentage of attempted Wave 3 follow-ups</i> | 83% | 70% | 83% | 60% | 76% |

Source: Abt Associates Inc.

Since only those who were randomized during the first year of CNO operations (before September 1994) were within the timeframe for Wave 3 Follow-ups, the percentages were quite small. Overall, 42 percent of those ever randomized were within the Wave 3 timeframe. Carle Clinic, which recruited heavily for CNO participants during its first year of operation, has a higher percentage of individuals within the wave 3 timeframe. In contrast, Carondelet, whose marketing efforts were more successful in later years, shows only 24 percent of its Treatments and Controls within the Wave 3 timeframe.

Overall, Abt Associates attempted to call 76 percent of those eligible for a Wave 3 Follow-up. The 1997 modification to the contract did not apply to those randomized September 1994 and before. Those who were not attempted included those who had died, those in hospice care or HMOs, and those who requested not to be called, as well as a few who were missed during the hiatus in survey efforts between December 1996 and February 1997.

Abt Associates was able to obtain completed Wave 3 Follow-ups from 76 percent of those within the timeframe. Response rates ranged from 83 percent at both Carle and LAH, to 60 percent at VNS.

References

- Ware, J. E. and Sherbourne, CD. 1992. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care* 30:473-483.

3.0 The CNO Evaluation: Design and Analysis

The Community Nursing Organization (CNO) Demonstration was structured so that the impacts of the intervention could be readily measured. Implementation of any novel approach to health care delivery, however, is a dynamic process where theoretical design concepts must sometimes be altered to accommodate real-world constraints. HCFA, the sites, and the evaluation contractor have collaborated in an effort to balance any problems in implementation with the evaluability of the project. The compromises that have sometimes been necessary, and their implications for the evaluation, are discussed below.

In this chapter, we summarize aspects of the demonstration's design, sources and types of data, and analytic approach that are relevant to the analyses that appear in later sections of this report. The majority of this information was presented in previous reports, and is reproduced here with some modifications for completeness.

3.1 Experimental Design

In order to develop the most precise estimates possible of the impacts of the CNO intervention, the demonstration was structured as a social experiment: the experiences and outcomes of participants (the treatment group) were compared to those of a cohort that was alike in all ways except their exposure to the intervention (the control group). Given that participation in the CNO was voluntary, and the decision to apply was likely to be influenced by hard-to-measure factors that also influence health outcomes, the only way to create a valid control group was to do so *after* the decision to participate had been made. In other words, the subset of the Medicare population that wished to participate in the CNO was likely to differ from those who had no interest in joining the CNO; therefore only those who wished to participate could be compared. All applicants were randomly assigned to treatment or control status after the decision to apply had been made, a consent statement had been signed, and collection of baseline data had occurred.

The primary analytic strategy for evaluation of CNO effects is the "intent to treat" approach commonly employed in the analysis of clinical trials. This method estimates CNO effects through appropriate contrasts of the experience of individuals assigned to the treatment and control groups regardless of whether those assigned to the treatment group actually enrolled in the CNO. This procedure will dilute the estimated effect of the CNO (positive or negative) on measured outcomes, utilization, and Medicare outlays. However it avoids the bias likely to result if these same contrasts were carried out between CNO enrollees and members of the control group. The bias results because those individuals in the control group who would have either failed to enroll or enroll or dropped out of the CNO had they been assigned to the treatment group cannot be identified. Therefore comparing *some* members of the treatment group (the enrollees) with *all* members of the control group produces an accurate estimate of CNO effects only if individuals drop out of the CNO completely at random, a most unlikely event.

To accommodate the program's need to build up enrollment quickly, random assignment was performed using a ratio of 2:1. Two applicants were assigned to the treatment group for every applicant assigned to the control group. This effective reduction in the size of the control group increased the minimum size of the impact that could be detected reliably. In determining a ratio for

the random assignment, the size of the impact that could be detected (and therefore the threshold for being considered a *significant* impact) was balanced against the sites' need to recruit more participants.¹

3.1.1 Implementation of Random Assignment

To avoid potential bias on the part of the CNO site staff who conducted baseline assessments, baseline data on the CNO applicants was collected *before* the applicants were randomized to treatment and control groups. Thus while they were implementing the baseline, the assessors did not know whether the applicant would in fact be able to enroll in the CNO. In order to facilitate and control the randomization process, Abt Associates developed a centralized CNO Random Assignment System (CNORAS) maintained at Abt Associates' offices in Cambridge, MA. After the baseline was performed, site staff "called in" via laptop computer and modem and entered basic data on each new applicant. The system assigned each applicant to the treatment or control group and gave a unique project identifier (the ABTID) to each applicant. Site staff copied down the ID and the assignment and entered it in site records. If an enrollee was already in the data base, the system indicated his or her existing ABTID and treatment/control assignment status.

Members of the same household who applied to the CNO were automatically assigned to the same treatment/control status. This was done to avoid problems in service delivery within the household and the likelihood of control group members benefiting from CNO services provided to treatment group members in the same household. To facilitate this assignment, site staff identified the potential eligible members of each applicant's household; these were termed Qualified Household Members (QHMs). Data on all QHMs were entered into the CNORAS, even if they were not applying to the CNO. QHMs who later decided to apply would hence automatically be assigned to the proper group.² This led to a slight increase in the ratio of treatments to controls, since Qualified Household Members of control group members would not have bothered applying to the CNO.

3.1.2 Special Situations

The original specifications for the implementation of random assignment called for the following sequence. First, the beneficiary would be recruited by the site and sign an informed consent form accepting participation in random assignment. Then collection of baseline assessment and other data for the evaluation would occur. The randomization assignment would finally be requested from Abt Associates: control group members would be informed of their status and have no further contact with the CNO, while treatment group members would be enrolled, receive a clinical assessment, and begin

1 For example, it was estimated that an assignment ratio of 2:1 meant that an 8 percent reduction in the rate of inpatient admissions could be detected with statistical power of .71 (at a 10 significance level), assuming total enrollment of 4,800 (3,200 in the treatment group and 1,600 in the control group). Allocating to treatment and control groups using a 1:1 ratio would have allowed a smaller impact to be detected with comparable power, but would have required the sites to have been satisfied with 2,400 treatment participants or to have recruited a larger total number of applicants to yield the same number of enrollees (3,200).

2 The system allowed site staff to link each applicant with one QHM, which covered the vast majority of situations encountered. Occasionally, an applicant had multiple QHMs. These were reported to Abt on a case-by-case basis, and Abt staff established the link in the CNORAS manually.

to receive CNO services. In practice, this sequence was not universal. The most frequent exceptions are described below:

- **Randomization before baseline assessment** Three of the four sites lacked laptop computers that would allow staff to call in to CNORAS from applicants' homes. At the outset, site staff protested that it was awkward and inefficient to conduct a baseline assessment, leave and obtain the random assignment, and return at some later date to perform a clinical assessment and develop a care plan for treatment group members. Eventually, it was agreed that CNO office staff could call in to CNORAS for cases that were to be assessed that day, obtain the assignments, conceal them in an envelope, and provide them to the assessment nurse. Once the baseline assessments were completed, the nurse could reveal the random assignment. If the applicant was assigned to the control group, the nurse would thank them and leave; if assigned to the treatment group, she could continue with the enrollment and care planning process.
- **Randomization without baseline assessment or enrollment** There were some situations where beneficiaries were randomly assigned but never received a baseline assessment, or were assigned to treatment status but never enrolled in the CNO. This would include cases where the beneficiary changed his/her mind about participation after being randomized, where the site assigned the beneficiary to treatment or control status before s/he had agreed to participate; where the beneficiary was determined to be ineligible for the CNO after being randomized; and where the beneficiary died before baseline or enrollment. These cases were relatively rare, but they do occupy "slots" in the CNORAS, and may therefore cause the analysis samples to depart from the 2:1 ratio. Treatments and controls who received no baseline assessment could not receive follow-up assessments from Abt Associates.
- **Contaminated Controls:** In several instances, beneficiaries who were randomly assigned to the control group were inadvertently enrolled in the CNO and received the same services as a member of the treatment group. To preserve the validity of the experiment, these cases were nonetheless analyzed as Controls.
- **Hiatus in randomization to the control group:** The CNO Evaluation was originally scheduled to end on December 31, 1995. Starting October 1, 1995, all new applicants were "randomized" to the treatment group, since no follow-up assessments allowing comparisons between treatments and controls would have been performed on applicants randomized after that date. In early 1996 HCFA modified the original contract allowing the evaluation to continue for another year. At that point in time, it was decided that the pool of control group members was already sufficiently large and that randomizing a small number of new controls would contribute little to the analysis. Throughout 1996, new members continued to be randomized to the treatment group. However, when the contract was again extended for two more years, the randomization of new applicants to both treatment and control groups was renewed. Overall, the hiatus in randomization to the control group lasted from October 1995 through December 1996. As a result, all 1,144 CNO applicants during that time period were enrolled as treatments, and the ratio of treatments to controls is slightly greater than 2:1.

3.2 Person-Level Samples for the Analysis on This Report

Analytic files were constructed for two categories of people: CNO applicants assigned to the treatment (CNO) group and CNO applicants assigned to the control group.

3.2.1 CNO Applicants: Treatment Group and Control Group

CNO applicants were randomized between December 17, 1993 and October 2, 1997. There are 13,856 entries in the Random Assignment file within this date range, although some of these entries were errors and do not reflect actual applicants. The treatment group consists of 9,691 entries (70 percent); the control group consists of 4,165 entries (30 percent). All analyses in this report use the number of months that have elapsed since the date of randomization as the measure of exposure to the CNO 'effect.' For each applicant, the date of randomization is considered to be their 'anchor' date.

Table 3.1 below shows the number of beneficiaries in the treatment group and control group by CNO site.

| | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|------------------------------------|----------------------|--------------------|----------|----------|--------|
| Number of Treatments | 2,536 | 3,217 | 2,064 | 1,874 | 9,691 |
| <i>As percentage of site total</i> | 69% | 69% | 69% | 73% | 70% |
| Number of Controls | 1,135 | 1,417 | 912 | 701 | 4,165 |
| <i>As percentage of site total</i> | 31% | 31% | 31% | 27% | 30% |
| Total | 3,671 | 4,634 | 2,976 | 2,575 | 13,856 |

Sources: Abt Associates Analytic Files; HCFA Enrollment Database.

Percentages listed represent the relative allocation of applicants to treatment and control groups, by site. By design, the sites would have recruited 67 percent treatments and 33 percent controls. However, the provision for Qualified Household Members (see section 3.1.1 above) as well as the hiatus in randomization to the control group (see section 3.1.2 above) led to a higher overall ratio of treatments to controls (70 percent versus 30 percent). VNSNY deviated the most from the original goal, assigning 73 percent of applicants to the treatment group and 27 percent to the control group.

3.2.3 Sub-samples considered for the analyses

Different samples and sub-samples were considered in the various analyses included in this report. In order to come to conclusions that would be the most accurate and have the greatest statistical and explanatory power, it was important to carefully choose appropriate segments of the CNO populations based upon the focus of particular analyses. Below we compare the different samples used in each chapter.

Chapter 4

In the *CNO Enrollment and Disenrollment* all individuals randomized from January 1994 through September 1997 to the treatment and control groups were included, with the one exception of individuals who were assigned certain "error codes." These codes signified that errors were made

during the randomization process (for instance, the same person was randomized twice, individuals who did not exist were randomized, or individuals who were in fact ineligible for the CNO were accidentally randomized). The codes also indicate whether an individual randomized to the Control Group actually enrolled in the CNO, and whether an individual randomized to Treatment never enrolled. In the case of faulty randomization codes, we analyzed the individual based on the original code assigned, not based on whether or not they actually enrolled.

Chapters 5 and 6

The chapters on *Outcomes: Health, Mortality and Functioning and Satisfaction and Preventive Care* are based on comparisons between baselines and follow-up assessment data. CNO Treatments and Controls who were randomized between December 1993 and September 1995 were considered for these analyses. The great majority of Treatments and Controls were randomized during this time period, and all would have been eligible to receive at least two follow-up assessments. We excluded individuals who did not receive a baseline assessment, since it would have been impossible to track changes in their health status and satisfaction over time.

In addition, two subsamples of the above group were studied. First, the "Intent-to-Treat" subsample follows the strict definition of a classical experiment: those individuals randomized to the treatment group were analyzed as Treatments, regardless of whether they were actually enrolled in the CNO at any particular point in time, and those randomized to the control group were always considered Controls. Thus an individual who voluntarily disenrolled from the demonstration would still be considered part of the Treatment group, even though she was no longer benefiting from CNO services. Likewise, individuals with faulty randomization codes were analyzed according to the original code assigned, not according to whether they actually received services from the CNO. The strength of this sample is that it maintains the purity of the Treatment and Control groups – it accounts for possible selection bias among Treatments who might have disenrolled because they were unhappy with the services (or lack of services) provided by the CNO.

The second subsample is the "Actually Treated" sample, which looks at Treatments who were currently enrolled in the CNO at the time of each assessment and *had been continuously enrolled up until that assessment*. If a Treatment disenrolled from the CNO, all future assessments were excluded from the analysis. The control group was also limited; any Control who at the time of assessment would have been ineligible for the CNO (had he or she been a treatment group member) was excluded from the sample from that point forward. This was determined by reviewing Medicare records and includes those who became ineligible due to End Stage Renal Disease (ESRD), admission to a hospice, or residence in a Skilled Nursing Facility (SNF) for more than 60 days. The advantage of this subset is that it maximizes the possibility of detecting a treatment effect if one exists. However, if an effect is detected, we cannot determine whether it resulted from treatment or from selection bias.

Chapters 7 and 8

The chapters on *Utilization of Health Care and Medicare Outlays*, which compare how CNO Treatments and Controls utilized CNO and non-CNO services, as well as how much these services cost Medicare, also consider individuals randomized between December 1993 and September 1995. Again, the sample of demonstration participants within this timeframe was seen as the best trade-off between a larger sample of people who had been in the CNO only for a short time, and a smaller sample of people who had been in the CNO for a long time. Service utilization and Medicare expenditures data were analyzed for the 25 months before and 36 months after each randomization,

up to a cutoff date of September 1997. Individuals without a baseline were not analyzed. Since the data were organized by month, it was possible to exclude individual records from particular months when beneficiaries were ineligible for the demonstration. Thus, individual records from months when a beneficiary was under 65, enrolled in an HMO, or ineligible for part A or B of Medicare were excluded from the analysis in these two chapters.

As in chapters 5 and 6, two subsets of this sample were compared. The "Intent-to-Treat" sample follows the definition listed above, analyzing all those randomized to the treatment and control groups, regardless of whether they were actually enrolled at any particular point in time. The "Actually Treated" sample takes records from the months during which the Treatments were actually enrolled in the CNO, and excludes individual records from months where they had voluntarily or involuntarily disenrolled. Controls in this subsample consist of those randomized to the control group, excluding records from the months when they were ineligible for the CNO due to ESRD, admission to a hospice, or residence in an SNF for more than 60 days.

3.3 Data Sources for the Quantitative Evaluation

Data for the analyses appearing in this report come from five sources: 1) Medicare enrollment and claims files from HCFA, 2) CNO Enrollment Files, 3) baseline questionnaire responses, 4) follow-up surveys conducted by Abt Associates, and 5) CNO site data (including nurse timesheets and service utilization by enrollees).

For members of both the treatment and control groups, Medicare claims files provide information on the use of services that are *not* part of the CNO package – for instance, physician, and hospital services. For members of the control group, Medicare claims files also provide data on the use of services that *are* part of the CNO package, but that control group members receive through fee-for-service Medicare. Data on utilization of CNO-covered services by treatment group members are based on files constructed by each of the four sites.

In order to measure the effects of the CNO intervention across all four CNO sites consistently, it was necessary for Abt to collect data on client health and functioning directly from beneficiaries. As outlined above, baseline data on client health and functioning were collected by CNO staff, usually before assignment to the treatment and control groups. Follow-up data were collected annually by Abt telephone interviewers. Data elements in the baseline and follow-up survey questionnaires included satisfaction with care, current level of physical functioning, number and severity of health problems, and out-of-pocket expenditures for health care not covered by Medicare or by the CNO.

3.3.1 Medicare Data Sources

Medicare service utilization and eligibility information was obtained from databases maintained by HCFA. The National Claims History Database (NCH) contains Part A and Part B claims records, including line item information on all services provided, for all claims since October 1, 1990. To analyze each beneficiary's utilization of Medicare services, we collected the following information from the Inpatient/Skilled Nursing Facility (SNF), Outpatient, Home Health Agency (HHA), Hospice, and Physician/Supplier claims files for all randomized beneficiaries:

Table 3.2
Summary of Samples for the Analyses, by Chapter

| Chap. | Includes individuals randomized between (dates): | Data collected from (date) to (date): | Total Sample Excludes: | "Intent-to-treat" Subsample | "Actually Treated" Subsample | |
|-------|--|---------------------------------------|---|---|--|---|
| | | | | Includes: | Includes: | Excludes: |
| 4 | 12/93-9/97 | 12/93-8/98 | •Individuals with certain error codes | N/A | N/A | N/A |
| 5 | 12/93-9/95 | 12/93-12/97 | •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment & continuously enrolled in CNO •All those randomized to Control who would have been eligible for the CNO | •Treatments who never enrolled •Treatments after they disenrolled •Controls after they became ineligible (ESRD, hospice, SNF) |
| 6 | 12/93-9/95 | 12/93-12/97 | •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment & continuously enrolled in CNO •All those randomized to Control who would have been eligible for the CNO | •Treatments who never enrolled •Treatments after they disenrolled •Controls who became ineligible (ESRD, hospice, SNF) |
| 7 | 12/93-9/95 | 12/91-9/97 | •Records for months when individual was under 65, enrolled in HMO, or ineligible for Medicare part A or B •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment during the months when they were actually enrolled •All those randomized to Control during the months when they would have been eligible for the CNO | •Treatments who never enrolled •Treatments during the months when they were disenrolled •Controls during the months when they would have been ineligible for the CNO (ESRD, hospice, SNF) |
| 8 | 12/93-9/95 | 12/91-9/97 | •Records for months when individual was under 65, enrolled in HMO, or ineligible for Medicare part A or B •Individuals without a baseline •Individuals with certain error codes | •All those randomized to Treatment and Control groups | •All those randomized to Treatment during the months when they were actually enrolled •All those randomized to Control during the months when they would have been eligible for the CNO | •Treatments who never enrolled •Treatments during the months when they were disenrolled •Controls during the months when they would have been ineligible for the CNO (ESRD, hospice, SNF) |

Sources: Abt Associates Inc.

- beneficiary identification numbers (Medicare health insurance claim numbers (HICN))
- provider identification numbers
- dates of service
- type of claims (inpatient/SNF, outpatient, HHA, hospice, physician/supplier, etc.)
- units of service
- submitted charges
- allowed charges
- reimbursement amount
- coinsurance and deductible amounts
- type of service codes
- place of service codes
- diagnosis codes
- procedure codes

Claims records were collected for the two years prior to each applicant's random assignment to the treatment or control group³ and up to 45 months following assignment.

The HCFA Enrollment Database (EDB) contains a few demographic data elements as well as the entitlement status of all Medicare beneficiaries, information necessary for determining beneficiaries' eligibility for this demonstration. Most of the information on the EDB is also available through the HCFA Health Insurance Skeleton Eligibility Write-Off (HISKEW) file, which has been produced from the EDB since January 1992. The HISKEW file was used to verify the Medicare status of individuals who might be eligible to participate in the demonstration. It provided the following types of information about Medicare enrollees:

- identification numbers (Medicare HICN)
- demographic information (date of birth, sex, race, state, county, zip code)
- date of death
- Medicare Part A entitlement and/or Part B enrollment and termination dates
- End Stage Renal Disease (ESRD) entitlement
- disability entitlement

It was necessary to access the EDB to obtain beneficiary names, and the HCFA Group Health (GHPMASTER) File to obtain dates of HMO enrollment (if any), since these pieces of information were not available from HISKEW. Similarly, the HCFA Hospice Enrollment File was used to identify the periods during which a beneficiary was in a Medicare hospice.

3.3.2 The CNO Enrollment Files

These files were maintained by HCFA to determine whether a CNO applicant was eligible for the demonstration, and to track which CNO Treatments were currently eligible for the CNO, as well as how many individuals were actually enrolled at each CNO site, by month. Sites were expected to verify whether an applicant was eligible by calling a designated HCFA staff person before

3 With the exception of those assigned in December 1993, for whom 23 months of baseline data were available

randomization. The enrollment files allowed HCFA to keep accurate eligibility records, and were necessary for HCFA to properly reimburse the CNOs each month.

3.3.3 Baseline and Follow-up Assessment Data

A comprehensive basic assessment tool was developed to capture baseline and follow-up data on functional status, satisfaction with health care, utilization, out-of-pocket cost of services, and selected demographic data. The basic instrument has six components:

- *Personal Background and Health History.* Personal background information includes age, gender, education, income, health insurance, and family situation data.
- *The Short Form Health Survey (SF-36) and Quality of Life Measures.* The Short Form Health Survey (SF-36), developed as part of the Medical Outcomes Study (Ware & Sherbourne, 1992), measured individuals' judgments about their well-being, energy level, and limitations in social, physical, and role activities, as well as their perceived health status.
- *The Health Risk Appraisal.* The Carter Center Health Risk Appraisal Instrument identified precursors of serious illness. Individual health behaviors and personal characteristics were used to calculate probability of dying in the next ten years from 42 causes of death. The computation was based on mortality statistics and epidemiological data. The Carter Center instrument included items relating to nutrition, smoking, alcohol use, seat belt use, mammograms, recent personal loss, and awareness of blood cholesterol and blood pressure.
- *Functional Status (ADLs, IADLs).* The Functional Status interview collected data on activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Portions of the CNO functional status items were identical to those used in the National Long-Term Care Survey, to allow comparisons between the CNO groups and national samples. Questions in the ADL portion of the interview focused on whether or not the enrollees had problems performing routine self-care tasks or moving about independently, if they had received human help in the past week, if they thought they got enough help, and the length of time they had had any of the problems. The IADLs portion of the interview addressed the participant's ability to carry out routine chores such as meal preparation, housework, and money management.
- *Pfeiffer Short Portable Mental Status Questionnaire (SPMSQ).* The SPMSQ is a 10-item, easily-administered instrument that provides quantitative results and a straightforward interpretation for clinically significant organic brain syndromes in the elderly. The ten items include questions regarding clients' orientation, recall, and cognitive ability. Scoring was based on the sum of incorrect responses.
- *Participant Service Utilization and Satisfaction Survey.* The CNO Participant Service Utilization and Satisfaction Survey was adapted from the Center for Governmental Research Inc. Independent Living for Seniors Satisfaction Survey, and was used to measure health care service use and patients' satisfaction with the delivery of these

services. The survey did not elicit any information concerning specific services or referrals provided by the CNO so that it could be administered to both the treatment and control groups.

In addition, during the first year of the contract, data on nursing diagnoses and outcomes were collected from a random sample of 20 percent of the applicants during baseline assessment. The Omaha System (Martin & Scheet, 1988; Martin, Leak & Aden, 1992; Martin & Scheet, 1992) instrument was selected with mutual agreement by Abt and the CNO sites. This problem classification scheme identifies 45 problems which are mutually exclusive and are organized into four domains:

- environmental
- psychosocial
- physiological
- health behaviors

The assessor would identify the presence or potential for each problem and rate the problem on three dimensions: knowledge, behavior, and status. The three dimensions were then rated on a five-point Likert scale. Based on the problem identification, appropriate care and services could be provided to the CNO treatment group.

Assessments were first conducted by CNO site staff at baseline. Follow-up assessments were conducted on an annual basis by telephone interviewers at Abt Associates' telephone survey center. Wave 1 Follow-Ups were scheduled for 15 months following randomization to avoid overlap with the sites' required reassessment of all treatment group members at 12 months following enrollment. Wave 2 Follow-Ups occurred at 27 months following randomization, and, if the applicant had been enrolled long enough, Wave 3 Follow-Ups occurred at 39 months after randomization.

1997 Contract Modification to the Follow-up Assessment Process

In 1997, the CNO Evaluation contract was extended and modified. One significant modification was the decision not to perform a Wave 2 Follow-up Assessment on the cohort of CNO Treatments who 1) had fewer than two functional limitations (ADLs or IADLs), and 2) had been randomized after September 1994. It was decided that these low-risk enrollees were unlikely to show significant changes in their health status from one follow-up to the next. Since the Wave 2 Assessment was both resource-intensive for Abt Associates and intrusive for the enrollees, it was dropped for this particular group. However, any enrollee who had been randomized between December 1993 and September 1994 continued to receive assessments, in order to ensure that one group would be subject to continuous analysis. Telephone follow-up continued for enrollees with two or more functional limitations.

3.3.4 CNO Site Data

Because the CNOs received capitation payments and did not submit Medicare claims for care provided under their service package, each site had to establish demonstration-specific systems to collect service utilization data and submit the data to Abt Associates. HCFA allowed each CNO to develop the data collection system best suited to the particular circumstances of the site. These data were to be used to compare the use of CNO-covered services by enrollees with the use of these services by non-CNO Medicare beneficiaries. In practice, the inconsistencies between each site's data collection system

made comparison somewhat challenging. We have attempted to combine the data in a comparable fashion for this analysis.

The CNO sites agreed to collect two types of service data to document the volume and types of services they provide to CNO enrollees. These were:

- Primary Nurse Provider (PNP) time sheets, to document the volume and type of direct and indirect services provided to enrollees by PNPs, and
- Service Utilization Data, intended to document other (non-PNP) services provided to enrollees by the CNO. These services included those provided by the CNO's contracted providers, such as durable medical equipment, home health care, physical therapy, and psychological counseling.

PNP Timesheets

The PNP timesheets captured data on the time spent by nurses on CNO activities. They were focused on associating nurse time with individual enrollees in order to facilitate direct analysis of the impact of nurse interventions on enrollee health outcomes. Each period of time spent by a PNP with an enrollee could be broken down into a series of beneficiary/service "bills." The basic unit was the time that a PNP spent providing a single service to an enrollee on a single day. For each service delivered, the following information was required:

- Primary Nurse Provider's identification code;
- type of service provided (home contact, CNO site contact, institutional contact, telephone contact, physician or other provider contact, meetings, or documentation and paperwork);
- type of intervention (assessment, teaching, psychosocial care, physical care, or coordination/ management);
- up to two related Omaha problems (see discussion of the Omaha Nursing Diagnosis System in section 3.3.3 above);
- time spent, in 5-minute increments;
- enrollee's ABTID; and
- date of service.

PNPs also reported data on time spent in non-enrollee-specific CNO activities, such as group activities, meetings, and marketing.

Although as mentioned above the sites were given latitude in configuring these items into their existing procedures, the sites were not entirely successful in reporting all of the core data items required by Abt Associates.

Service Utilization Data

Service Utilization Data was intended to document the services delivered to enrollees by the CNO. Since most sites contracted with other agencies for most of the non-PNP services (for instance, physical therapy, home health care, or durable medical equipment), much of the service utilization data were already available from contractors' billing records and other existing data systems. Because site circumstances varied so widely, Abt Associates again allowed the sites develop individual formats for these data submissions, while requiring that certain core data items be reported:

- enrollee ABTID.
- Primary Nurse Provider's Identification Code.
- place of service (home, CNO site, institution, other);
- date of service.
- type of service (HCPCS code, HHA revenue code, etc.).
- quantity of service (minutes/hours, pieces of equipment, etc.)
- Omaha problems being addressed or diagnosed.

Again, the sites were not successful at collecting and reporting data on all of these items, though basic data on the volume of service provided is available from all sites. Reporting on the provision of durable medical equipment (DME) presented special difficulties. The CNOs often re-used pieces of equipment; however, there would be no new billing record for the provision of used equipment, and thus the service provision was difficult to track.

3.3.6 Summary Table of Data Sources

Table 3.2 below presents a summary of the type and sources of data for treatment and control group members that are used in this report. Using all of these data, a variety of files were constructed for the analyses which appear in subsequent chapters of this report.

Table 3.2: Summary of Data by Sources

| | HCFA | | | CNO | | | Abt |
|-----------|---------------------------------------|----------------|---------------|---------------------|-----------------|---------------------|----------------------|
| | Medicare Service Utilization (Claims) | CNO Enrollment | Medicare EDB* | Baseline Assessment | PNP time-sheets | Service Utilization | Follow-up Assessment |
| Treatment | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control | ✓ | | ✓ | ✓ | | | ✓ |

*Enrollment Data Base

3.3.7 Analytic Files Constructed for the Evaluation

The following analytic files were constructed for the final evaluation:

- **CNO Master File.** This file was drawn from Abt Associates' randomization program (CNORAS) and the CNO Enrollment file maintained by HCFA. It lists all of the CNO Treatment and Control Group members, and gives an overview of each beneficiary's history with the CNO. Enrollment and disenrollment dates, rate cells, and dates of 6-month reassessments are included, as is a code listing whether baseline and follow-up assessments were completed. In addition, "error codes" assigned to each beneficiary are listed, indicating whether the site made errors during the randomization process. When linked with other files for analysis, these erroneous records could be selectively eliminated as desired.
- **CNO Eligibility Files.** These files were constructed from Medicare's Enrollment Database and listed the eligibility dates for each Treatment and Control. Each record is at the beneficiary-month level and thus can show changes in eligibility over time.
- **Rate Cell File.** Based on the CNO Enrollment Files kept by HCFA, this file lists the rate cell each beneficiary was assigned to during a particular month of the demonstration.

- **Baseline Assessment Files** Baseline files were constructed using files sent to Abt Associates by each site. There is one record for every Treatment and Control, and missing values for those randomized who never received a baseline
- **Follow-up Assessment File.** One follow-up assessment file was constructed based on data from all four sites. The cumulative results of all completed surveys for each Treatment and Control are listed.
- **Time Allocation File.** Constructed from on the PNP timesheet data, this file has one record for each site by month, for a total of 178 records. All services that nurses performed at a CNO during a particular month were summed together.
- **CNO Utilization File** This file is based on Service Utilization data received from the sites and contains one record per CNO Treatment and Control, by month.
- **Medicare Utilization Files.** A file for CNO Treatments and Controls was constructed based on Medicare Service Utilization (Claims) data. The file is at the person level, and contains data aggregated by month. For comparative purposes, data were also collected for the 24 months preceding an individual's randomization.

3.4 Response Rates to Baseline and Follow-up Assessments

Table 3.3 outlines the completion rate of baseline assessments, as a percentage of the total number of applicants randomized to the treatment and control groups during the evaluation (December 1993 through October 1997):

| | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|----------------------|--------------------|----------|----------|--------|
| Treatment | 2,308 | 2,935 | 1,949 | 1,557 | 8,749 |
| <i>As percentage of total applicants randomized to treatment group</i> | 91% | 91% | 94% | 83% | 90% |
| Control | 1,000 | 1,322 | 868 | 594 | 3,784 |
| <i>As percentage of total applicants randomized to control group</i> | 88% | 93% | 95% | 85% | 91% |
| Total | 3,308 | 4,257 | 2,817 | 2,151 | 12,533 |
| <i>As percentage of total randomized applicants</i> | 90% | 92% | 95% | 84% | 90% |

Source: Abt Associates Inc

The effectiveness of the sites in completing baselines ranged from 84 percent at VNS to 95 percent at LAH. Although baseline assessments should have been performed before randomization to the treatment and control groups, and thus all those randomized should have a baseline, it is clear that in a number of cases randomization happened first (see discussion in section 3.1.2 above). When randomization did occur first, several reasons may explain why no baseline was performed. First, it was possible that a randomized applicant would change his or her mind before the baseline was performed and decide not to participate in the demonstration. Also, some applicants died before baselines could be performed, and in some cases baselines were started but not completed.

Table 3.4 shows the completion rates for the Wave 1 Follow-up Assessments, performed by Abt Associates on both treatment and control group members 15 months after randomization.

Table 3.4: Number of Enrollees within the Wave 1 Follow-up Assessment Timeframe

| | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|----------------------|--------------------|----------|----------|--------|
| Treatment | 2166 | 2504 | n = 1793 | 1449 | 7912 |
| <i>As percentage of total applicants randomized to treatment group</i> | 85% | 78% | 87% | 77% | 82% |
| Control | 1014 | 1203 | 870 | 655 | 3742 |
| <i>As percentage of total applicants randomized to control group</i> | 89% | 85% | 95% | 93% | 90% |
| Total | 3180 | 3707 | 2663 | 2104 | 11,654 |
| <i>As percentage of total randomized applicants</i> | 86% | 80% | 89% | 82% | 84% |

Source: Abt Associates Inc.

In order for enrollees to be eligible for a Wave 1 Follow-up Assessment, their randomization date must have been at least 15 months before the end of the demonstration (December 1997). Thus any applicant randomized between September 1996 and December 1997 would not have been eligible to receive a first follow-up. Of the total number ever randomized, 84 percent were within the Wave 1 timeframe.

Table 3.4 Continued: Wave 1 Follow-up Assessment Response Rates

| Attempted Wave 1 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|---|----------------------|--------------------|----------|----------|--------|
| Treatment | 1938 | 2095 | 1610 | 1104 | 6747 |
| <i>As percentage of those within the Wave 1 timeframe</i> | 89% | 84% | 90% | 76% | 85% |
| Control | 904 | 1106 | 794 | 558 | 3362 |
| <i>As percentage of those within the Wave 1 timeframe</i> | 89% | 92% | 91% | 85% | 90% |
| Total | 2842 | 3201 | 2404 | 1662 | 10,109 |
| <i>As percentage of those within the Wave 1 timeframe</i> | 89% | 86% | 90% | 79% | 87% |
| Completed Wave 1 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1742 | 1887 | 1491 | 838 | 5958 |
| <i>As percentage of attempted Wave 1 follow-ups</i> | 90% | 90% | 93% | 76% | 88% |
| Control | 797 | 877 | 671 | 313 | 2658 |
| <i>As percentage of attempted Wave 1 follow-ups</i> | 88% | 79% | 85% | 56% | 79% |
| Total | 2539 | 2764 | 2162 | 1151 | 8616 |
| <i>As percentage of attempted Wave 1 follow-ups</i> | 89% | 86% | 90% | 69% | 85% |

Source: Abt Associates Inc.

We attempted to reach a total of 87 percent of CNO Treatments and Controls who were within the timeframe to receive a Wave 1 Follow-up. Several reasons account for the thirteen percent who were never attempted. Some individuals had died, others had become ineligible for the demonstration because they had joined an HMO or were receiving hospice care. Individuals who had never received a baseline assessment were not called for any follow-ups. Some CNO treatments and controls wrote or called Abt Associates specifically to request that they not be called, and we respected their wishes. Finally, during the months of December 1996 through February 1997, there was some uncertainty regarding the continuation of the evaluation. Since the survey process would originally have ended in December 1996, surveying efforts temporarily ceased until the decision was made to continue the evaluation.

We were able to obtain completed Wave 1 Follow-up surveys from 88 percent of the Treatments and 79 percent of the Controls who were called. There are several reasons why interviews might not have been completed: the individual refused to participate or broke off the interview before completion; the interviewer was unable to reach the enrollee after numerous attempts; or a language barrier prevented completion. As would be expected, completion rates were slightly higher for Treatments than for Controls, the latter being more likely to refuse to participate in the phone interview as they were not benefiting from CNO services. LAH participants had the highest completion rate (90 percent) while we were least likely to obtain a completed first follow-up assessment from VNSNY participants (69 percent).

Table 3.5 shows Wave 2 Follow-up Assessment response rates. Wave 2 Follow-ups were implemented 27 months after randomization.

Table 3.5: Wave 2 Follow-up Assessment Response Rates

| No. of Enrollees Within the Wave 2 Follow-up Assessment Timeframe | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|-------------------|-----------------|----------|----------|--------|
| Treatment | 2160 | 2491 | 1786 | 1433 | 7870 |
| <i>As percentage of total applicants randomized to treatment group</i> | 85% | 77% | 87% | 76% | 81% |
| Control | 1013 | 1202 | 870 | 655 | 3740 |
| <i>As percentage of total applicants randomized to control group</i> | 89% | 85% | 95% | 93% | 90% |
| Total | 3173 | 3693 | 2656 | 2088 | 11,610 |
| <i>As percentage of total randomized applicants</i> | 86% | 80% | 89% | 81% | 84% |
| Attempted Wave 2 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1415 | 809 | 755 | 707 | 3686 |
| <i>As percentage of those within the Wave 2 timeframe</i> | 66% | 32% | 42% | 49% | 47% |
| Control | 689 | 407 | 385 | 366 | 1847 |
| <i>As percentage of those within the Wave 2 timeframe</i> | 68% | 34% | 44% | 56% | 49% |
| Total | 2104 | 1216 | 1140 | 1073 | 5533 |
| <i>As percentage of those within the Wave 2 timeframe</i> | 66% | 33% | 43% | 51% | 48% |

| Completed Wave 2 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|---|-------------------|-----------------|----------|----------|-------|
| Treatment | 1254 | 628 | 652 | 500 | 3034 |
| <i>As percentage of attempted Wave 2 follow-ups</i> | 89% | 78% | 86% | 71% | 82% |
| Control | 594 | 282 | 327 | 171 | 1376 |
| <i>As percentage of attempted Wave 2 follow-ups</i> | 86% | 69% | 85% | 47% | 74% |
| Total | 1848 | 910 | 981 | 671 | 4410 |
| <i>As percentage of attempted Wave 2 follow-ups</i> | 88% | 75% | 86% | 63% | 80% |

Source: Abt Associates Inc.

In order for CNO members to be eligible for Wave 2 Follow-ups, they had to have been randomized by September 1995. Of the total number of individuals ever randomized, 84 percent were within this timeframe.

The number of individuals whom Abt Associates attempted to reach for a second follow-up dropped sharply during Wave 2: forty-eight percent of those within the timeframe for Wave 2 were attempted for a Wave 2 Follow-up. This drop can be explained by the January 1997 modification to the CNO Evaluation contract, which was discussed above (see Section 3.3.3). As a result of this modification, any individual randomized after September 1994 who had fewer than two ADL or IADL limitations was not called for a Wave 2 Follow-up. A large percentage of CNO Treatments and Controls were relatively healthy and had few functional limitations, and therefore would not have been called for a second follow-up. Other reasons why Abt Associates did not attempt to complete Wave 2 Follow-ups include those outlined for Wave 1 above: individuals had died, became ineligible by joining an HMO or entering a hospice, or requested not to be called. The hiatus in survey efforts between December 1996 and February 1997 also meant that a small number of interviews were never attempted.

We were able to complete Wave 2 Follow-up Assessments for 80 percent of the Treatments and Controls who were called. This shows a slight decrease from the completion rate of Wave 1 Follow-ups, most likely because individuals were becoming less interested in repeating a lengthy phone survey after 27 months of participation in the demonstration. Carle Clinic Treatments and Controls showed the highest completion rate (88 percent) while only 71 percent of VNS Treatments and 47 percent of VNS Controls completed Wave 2 Follow-ups.

Table 3.6 lists response rates for the final Wave 3 Follow-up Assessments. These were performed 39 months after randomization.

Table 3.6: Wave 3 Follow-up Assessment Response Rates

| No. of Enrollees Within the Wave 3 Follow-up Assessment Timeframe | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|--|-------------------|-----------------|----------|----------|-------|
| Treatment | 1517 | 787 | 712 | 901 | 3917 |
| <i>As percentage of total applicants randomized to treatment group</i> | 60% | 24% | 35% | 48% | 40% |

| | | | | | |
|--|--------------------------|------------------------|-----------------|-----------------|--------------|
| Control | 755 | 348 | 336 | 417 | 1856 |
| <i>As percentage of total applicants randomized to control group</i> | 67% | 25% | 37% | 59% | 45% |
| <hr/> | | | | | |
| Total | 2272 | 1135 | 1048 | 1318 | 5773 |
| <i>As percentage of total randomized applicants</i> | 62% | 24% | 35% | 51% | 42% |
| <hr/> | | | | | |
| Attempted Wave 3 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1258 | 553 | 548 | 572 | 2931 |
| <i>As percentage of those within the Wave 3 timeframe</i> | 83% | 70% | 77% | 63% | 75% |
| <hr/> | | | | | |
| Control | 606 | 268 | 270 | 299 | 1443 |
| <i>As percentage of those within the Wave 3 timeframe</i> | 80% | 77% | 80% | 72% | 78% |
| <hr/> | | | | | |
| Total | 1864 | 821 | 818 | 871 | 4374 |
| <i>As percentage of those within the Wave 3 timeframe</i> | 82% | 72% | 78% | 66% | 76% |
| <hr/> | | | | | |
| Completed Wave 3 Follow-up Assessment | Carle Clinic (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
| Treatment | 1059 | 399 | 466 | 381 | 2305 |
| <i>As percentage of attempted Wave 3 follow-ups</i> | 84% | 72% | 85% | 67% | 79% |
| <hr/> | | | | | |
| Control | 479 | 178 | 212 | 140 | 1009 |
| <i>As percentage of attempted Wave 3 follow-ups</i> | 79% | 66% | 79% | 47% | 70% |
| <hr/> | | | | | |
| Total | 1538 | 577 | 678 | 521 | 3314 |
| <i>As percentage of attempted Wave 3 follow-ups</i> | 83% | 70% | 83% | 60% | 76% |

Source: Abt Associates Inc.

Since only those who were randomized during the first year of CNO operations (before September 1994) were within the timeframe for Wave 3 Follow-ups, the percentages were quite small. Overall, 42 percent of those ever randomized were within the Wave 3 timeframe. Carle Clinic, which recruited heavily for CNO participants during its first year of operation, has a higher percentage of individuals within the wave 3 timeframe. In contrast, Carondelet, whose marketing efforts were more successful in later years, shows only 24 percent of its Treatments and Controls within the Wave 3 timeframe.

Overall, Abt Associates attempted to call 76 percent of those eligible for a Wave 3 Follow-up. The 1997 modification to the contract did not apply to those randomized September 1994 and before. Those who were not attempted included those who had died, those in hospice care or HMOs, and those who requested not to be called, as well as a few who were missed during the hiatus in survey efforts between December 1996 and February 1997.

Abt Associates was able to obtain completed Wave 3 Follow-ups from 76 percent of those within the timeframe. Response rates ranged from 83 percent at both Carle and LAH, to 60 percent at VNS.

References

- Ware, J. E. and Sherbourne, CD. 1992. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care* 30:473-483.

4.0 CNO Enrollment

4.1 Introduction

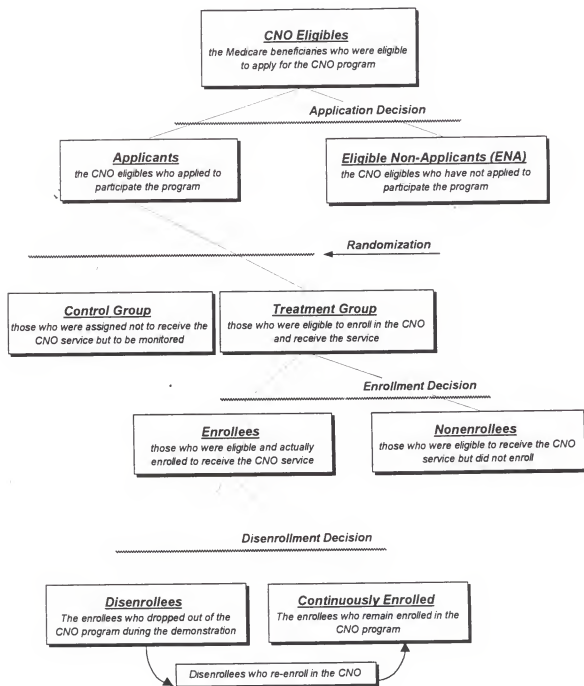
Implementation of the CNO Demonstration began in January 1994. All Medicare beneficiaries residing in the defined areas close to the CNOs who were entitled to benefits under Part A and who were enrolled in Part B were eligible, with the following exceptions: 1) HMO enrollees who wished to maintain this membership, 2) beneficiaries receiving services under the Medicare hospice benefit, and 3) beneficiaries entitled to the End Stage Renal benefit. Each CNO was required to hold at least one open enrollment period during the operational phase of the demonstration and to accept any eligible beneficiary who applied for membership. This chapter provides an overview of the enrollment activity in the four CNO demonstration sites through September 1997. Section 4.2 begins with a general discussion of the enrollment patterns that have developed at each site. Section 4.3 describes the characteristics of CNO applicants. An analysis of disenrollment from the CNO concludes the chapter in Section 4.4. Appendix 4.A contains supplementary exhibits.

For clarification of the processes and terms that will be mentioned throughout this chapter, it is worthwhile to refer to Figure 4.1 on the next page, which depicts the series of “events” that caused CNO eligible beneficiaries to be classified into alternative analytic categories. Starting at the top of the diagram, beneficiaries eligible for the CNO are placed into two groups: 1) those who applied for CNO membership (applicants), and 2) those who chose not to apply (Eligible Non-Applicants, or ENA).¹ Two-thirds of the applicants were randomized into the CNO Treatment group, and one-third to the CNO Control group. The penultimate tier of Figure 4.1 divides the treatment group into the enrollees and the non-enrollees, as some individuals assigned to Treatment decided not to enroll. Finally, CNO enrollees were not prevented from disenrolling so that the enrollee group is further divided into those who remain (the continuously enrolled population), and those who disenrolled. The diagram also depicts a subset of disenrollees who returned to the CNO.

The randomization process, described in chapter 3, was designed to ensure comparability between the Treatment and Control groups so that any difference in outcomes would be an unbiased estimate of the average effect of the CNO intervention. As shown in Table 4.1, observable differences between the treatment and control groups were minimal.

¹ For an explanation of eligibility guidelines, please see Chapter 3.

Figure 4.1: Analytic Categories in the CNO Demonstration



4.1.2 Sample and Methodology

The analyses in this chapter are based on combined data from the following three files: 1) the CNO enrollment database, 2) the CNO Assessment Instruments, and 3) the Medicare Enrollment Database (EDB). The sample includes all individuals randomized from January 1994 through September 1997 to the treatment and control groups, with the one exception of individuals who were assigned "error codes." These codes signified that errors were made during the randomization process (for instance, the same person was randomized twice; individuals who did not exist were randomized; or individuals who were in fact ineligible for the CNO were accidentally randomized). The codes also indicate whether an individual randomized to the Control Group actually enrolled in the CNO, and whether an individual randomized to Treatment never enrolled. In the case of faulty randomization codes, we analyzed the individual based on the original code assigned, not based on whether or not they actually enrolled. The sample excludes those who did not receive a baseline assessment.

In the next section, each CNO site is assessed by enrollment patterns and applicants' socio-demographic characteristics and health conditions recorded at baseline assessment during random assignment. Section 4.4 will look at disenrollment patterns and differences among the voluntarily disenrolled, involuntarily disenrolled, and the continuously enrolled. The statistical significance of differences among the three groups are assessed using parametric (χ^2) tests.

Table 4.1: Characteristics of Treatment and Control Groups by site

| | Carle (IL) | | Carondelet (AZ) | | LAH (MN) | | VNS (NY) | |
|---|---------------------|-------------------|---------------------|-------------------|---------------------|------------------|---------------------|------------------|
| | Treatment n=2308 | Control n=1000 | Treatment n=2935 | Control n=1322 | Treatment n=1949 | Control n=868 | Treatment n=1557 | Control n=594 |
| Mean Age | 72.9 | 72.9 | 74.6 | 74.7 | 76.1 | 75.8 | 77.8 | 77.7 |
| % Female | 59.2% | 60.3% | 61.9% | 60.0% | 67.3% | 65.6% | 76.7% | 78.1% |
| % White | 97.8% | 97.8% | 94.5% | 94.8% | 98.5% | 98.9% | 94.9% | 93.1% |
| % Hispanic | 0.6% | 0.0% | 4.4% | 4.7% | 0.3% | 0.1% | 3.2% | 3.6% |
| % College education or higher | 42.2% | 40.0% | 56.7% | 57.5% | 31.3% | 33.1% | 24.5% | 26.1% |
| Annual Income less than 40,000 | 77.1% | 78.5% | 76.9% | 74.4% | 91.1% | 90.6% | 94.5% | 95.6% |
| % Married | 69.0% | 66.2% | 63.8% | 63.4% | 51.2% | 51.0% | 32.2% | 30.9% |
| % with Major Illness in the past 12 month | 16.3% | 16.6% | 22.7% | 23.6% | 16.6% | 15.4% | 16.2% | 16.2% |
| % Currently enrolled in Medicaid | 4.6% | 4.2% | 0.8% | 0.8% | 2.7% | 4.6% | 4.1% | 4.0% |

Source: Baseline Assessments

Note: Treatment/Control differences are not statistically significant.

4.2 Enrollment in the CNOs

CNOs began randomizing applicants to the CNO Demonstration projects in January 1994, and continued through September 1997. Eighty-four percent (7,267) of the applicants assigned to treatment who enrolled were recruited within the first two years of the demonstration, between January 1994 and December 1995. Over the next 21 months of the demonstration, only 1,425 additional participants enrolled, for a cumulative total of 8,692 “ever-enrolled” individuals by September 30, 1997.

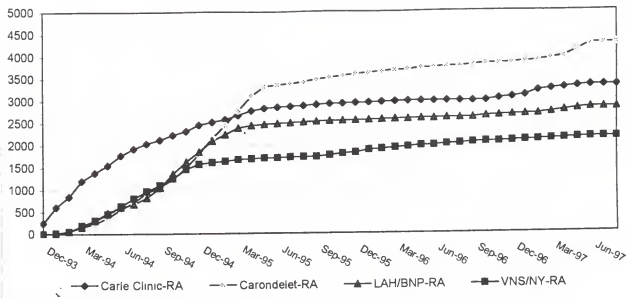
Figures 4.2 and 4.3 on the next page show cumulative random assignment and enrollment by site. In the first year of the demonstration, Carle recruited the largest number of CNO applicants. Carle enrollees accounted for 34 percent of total CNO enrollment across all sites by December 1994; Carondelet enrollees accounted for 25 percent, LAH 21 percent, and VNS 20 percent. By the end of December 1995, Carondelet had become the largest site; its enrollment constituted about 33 percent of total CNO enrollment. Carle followed with 27 percent, LAH with 24 percent, and VNS 16 percent. As of September 30, 1997, this distribution of enrollment had remained relatively constant. Carondelet enrollees still accounted for about a third of total enrollment across all the CNOs, with 2,910 individuals who had ever enrolled. This was followed by Carle, with 2,306 “ever enrolled” individuals (26 percent of the total), LAH with 1,949 (22 percent), and VNS with 1,527 (18 percent).

Table 4.2 provides an overview of enrollment activity at the four sites for the period December 1993 through September 1997.

| | Carle (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|---|-------------------|------------------------|-----------------|-----------------|--------------|
| Total number randomized to both Treatment and Control groups, with completed baseline assessments, as of August 1997 | 3308 | 4257 | 2817 | 2151 | 12533 |
| Total number randomized to the Treatment group, with completed baseline assessments, as of August 1997 | 2308 | 2935 | 1949 | 1557 | 8749 |
| Total number of Treatments ever enrolled in a CNO, as of September 30, 1997 | 2306 | 2910 | 1949 | 1527 | 8692 |
| As percentage of those randomized to Treatment and with baseline assessments | 99.9% | 99.2% | 100% | 98.1% | 99.4% |

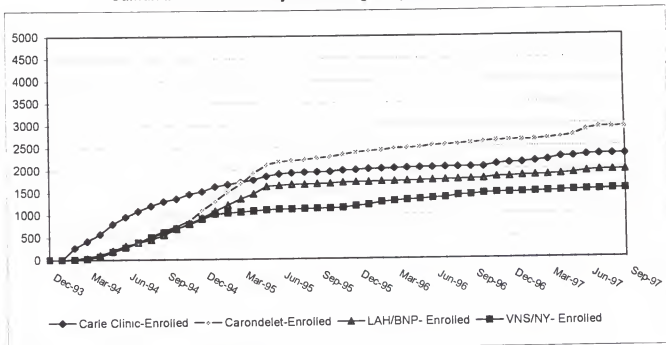
Source: Health Care Financing Administration "CNO Enrollment File"

Figure 4.2
Cumulative Random Assignment by Site through August 1997



Source: Health Care Financing Administration

Figure 4.3
Cumulative Enrollment by Site through September 1997



Source: Health Care Financing Administration

4.3 Sociodemographic Characteristics of CNO Applicants

Responses to the CNO Baseline Assessment suggest that CNO applicants are generally white, healthy, well educated, and earn average to above average incomes. This section presents the site-specific characteristics of CNO applicants. The characteristics of the CNO applicants do differ among the sites and remain consistent with the findings in the First and Second Interim Reports.

Table 4.3: Sociodemographic characteristics of CNO Applicants

| | Carle (IL) n=3308 | Carondelet (AZ) n=4257 | LAH (MN) n=2817 | VNS (NY) n=2151 |
|---------------------------------------|----------------------|---------------------------|--------------------|--------------------|
| Female | 59.5% | 61.3% | 66.7% | 77.0% |
| Married | 68.1% | 63.7% | 52.8% | 31.8% |
| Live Alone | 27.4% | 29.8% | 42.6% | 57.6% |
| Age: | | | | |
| ≤65 | 2.8% | 2.5% | 1.3% | 1.3% |
| 65 - 74 | 60.4% | 50.0% | 44.2% | 32.8% |
| 75 - 79 | 19.6% | 24.5% | 22.7% | 24.3% |
| 80 - 84 | 11.3% | 14.7% | 18.7% | 23.5% |
| 85 + | 6.0% | 8.3% | 13.1% | 18.2% |
| Race: | | | | |
| White | 97.8% | 94.5% | 98.6% | 94.1% |
| Other | 1.4% | 1.0% | 0.3% | 3.6% |
| Hispanic | 0.5% | 4.5% | 0.2% | 3.3% |
| Education: | | | | |
| < High School | 20.9% | 12.2% | 27.7% | 38.4% |
| Completed High School or Trade School | 37.6% | 30.8% | 40.5% | 36.5% |
| Some college or more | 41.5% | 56.9% | 31.8% | 24.9% |
| Income: | | | | |
| < \$20,000 | 36.6% | 34.2% | 54.4% | 67.2% |
| \$20,001 to \$60,000 | 47.9% | 50.6% | 36.8% | 22.6% |
| >\$60,000 | 8.6% | 7.0% | 2.1% | 1.4% |
| Owns Home | 85.9% | 83.3% | 79.3% | 39.5% |

| | Carle (IL) n=3308 | Carondelet (AZ) n=4257 | LAH (MN) n=2817 | VNS (NY) n=2151 |
|--|----------------------|---------------------------|--------------------|--------------------|
| Insurance Status: | | | | |
| Currently Receives Medicaid | 5.6% | 2.3% | 4.4% | 4.1% |
| Enrolled in other insurance (e.g. Medigap) | 93.5% | 91.7% | 92.2% | 76.4% |

Source. CNO Baseline Assessment Instruments.

*Note: Total percentages may not equal 100 due to omission of missing or invalid responses, particularly in the income measure

4.3.1 Carle CNO

Carle was the second largest CNO with 3,308 applicants. Like the other sites Carle had a majority of female applicants (59.5%). Only 27.4% of the Carle sample lived alone and 68% were married. Sixty percent of the sample were between the ages of 65 and 74. An additional 20% were 75-79 years old.

When examining the demographic characteristics of the Carle applicants, it is useful to compare the CNO data to the census data for the counties served by the Carle Clinic. (See Appendix 4.A for census data on the counties served by the CNO sites.) Such comparisons must be made with caution since the demographic characteristics in the table do not only reflect characteristics of the population eligible for the CNO. For example, levels of educational attainment may be unevenly distributed through the population. This could mean that the majority of people that never finished high school are elderly, while those with a high school diploma are mostly young adults.

The racial composition recorded in the census suggest that whites may have been over-represented in the CNO sample. Nearly 98% of the CNO applicants identified themselves as white; however, county population statistics show that 10% of the residents reported that they were 'Black,' 'Hispanic,' or 'Other.'

Carle has highly educated applicants. Over 41% of the respondents here stated that they had 'some college' or more education. Only 21% had not graduated from high school or trade school. These findings are similar to the statistics for the counties served by Carle. In addition, statistics measuring income and home ownership show that Carle applicants were relatively more affluent than the overall population of the counties. However, over a third of the applicants (37%) reported incomes below \$20,000 per year.

About six percent of respondents from Carle are enrolled in Medicaid and over 93% have some form of auxiliary insurance such as Medigap.

4.3.2 Carondelet CNO

The largest CNO was Carondelet in Arizona where 4,257 people applied, 61% of whom were women. The greatest proportion of this sample (50%) was between the ages of 65 and 74, and another fourth reported that they were between 75 and 79.

Comparisons with census data for the counties served by Carondelet reveal that Carondelet applicants may over-represented the white population in the area. Although this CNO clinic had the greatest number of Hispanic applicants (4.5%), people identifying themselves as Hispanic comprised 27% of the population in the counties served by the Carondelet clinic. Further analysis of the counties' age structure compared to the racial composition would be necessary to determine if Hispanics were truly under represented in the Carondelet sample.

CNO applicants at Carondelet had attained the highest levels of education of the four sites. Over half (57%) had attended some college or more schooling. Moreover, this site reported the smallest proportion of respondents with less than a high school diploma (12%). These statistics describe a sample that was relatively more educated than the counties whose population was served by Carondelet clinic.

Applicants' reported income levels were equivalent to statistics describing the population at large. More than a third of this elderly population (34%) had an annual income of less than \$20,000. Slightly more of the CNO applicants owned their homes, compared to the general population of the counties surrounding the Carondelet clinic.

This site had the smallest proportion of applicants receiving Medicaid, two percent. Ninety-two percent also had auxiliary insurance.

4.3.4 LAH CNO

LAH randomized 2,817 people, two-thirds of whom were women. Slightly more than half of the applicants (53%) were married and 43% lived alone. Forty-four percent of the respondents reported that they were between 65 and 74, while another 23% were between 75 and 79. Thirty-two percent of the applicants were 80+ years old.

Once again, in comparison to census statistics from the county served by LAH, it seems that whites may be over-represented in the CNO sample. Although the census data indicate that whites constituted 90% of the local population, LAH had the largest proportion of whites (99%) of the four sites. Blacks, who comprised 5.5% of the counties' population, were only 0.3% of the applicants to the CNO.

Although the census statistics are not age-adjusted, LAH applicants may have relatively *less* education than the general population of the counties served by the clinic. Twenty-eight percent of the sample had not graduated from high school compared to only 12% of the counties' population. According to the census data, over half of the counties' population (52%) had at least 'some college' education, while only 32% of the applicant pool reported this much schooling.

Over half of the applicants to the LAH CNO reported incomes of less than \$20,000. Overall, the distribution of income levels in the LAH sample and the census statistics were equivalent. However, 79% of the respondents owned their homes, while only 69% of the residents in the counties owned their homes.

Four percent of the LAH applicants reported Medicaid enrollment and 92% have auxiliary insurance.

4.3.5 VNS CNO

The smallest site in the CNO is VNS with 2,151 applicants. Seventy-seven percent of the sample at VNS were women, making this site the most disproportionately female. Only 32% of the respondents reported being married and unlike the other sites the majority lived alone (58%). Consistent with these facts is the age distribution, which was skewed toward the older age groups at VNS. Twenty-four percent were 75 to 79 years old and another 42% were 80 or older.

As VNS recruited from a small section of Queens, it is the least representative of that county's racial make up according to census data in the appendix. Although only 58% of the population identified themselves as white, 94% of the CNO applicants were white. Blacks and Hispanics comprised 42% of the area's population, but only seven percent of the CNO sample.

Thirty-eight percent of the VNS applicants had not graduated from high school. This was a greater proportion than was found in the area's population (29%). This site also had the fewest applicants with 'some college or more' education (25%), eleven percent less than the number of people that reported this level of education to the census.

VNS had the greatest proportion of people earning less than \$20,000 per year (67%), with only 23% earning middle incomes of \$20,001 to \$60,000 per year. This site also had the fewest applicants reporting that they owned their own home (39.5%).

Four percent of the sample at VNS were enrolled in Medicaid. However, only 76% had auxiliary insurance, the smallest proportion of all the CNO groups.

4.4 Disenrollment from the CNO

As outlined in the interim reports, enrollees were permitted to disenroll from the CNO at any time, and may have been involuntarily disenrolled under certain conditions. No enrollee was forced out of the demonstration because of high utilization. Below is a list of voluntary or involuntary disenrollment reasons :

- **Voluntary Disenrollments**
 - Enrollees who chose to drop out at the end of any calendar month;
 - Enrollees who refused to receive a six-month reassessment;
 - Enrollees who joined an HMO; or
 - Other.
- **Involuntary Disenrollments**
 - Enrollees who failed to maintain enrollment in Parts A and B of Medicare;
 - Enrollees who used the Medicare hospice benefit;
 - Enrollees who remained in a hospital or nursing home for more than 60 days;
 - Enrollees who left the CNO service area for more than 30 consecutive days;
 - Enrollees who agreed to a six-month reassessment, but whom the CNO staff failed to reassess within the appropriate timeframe;
 - Enrollees who had End Stage Renal Disease; or
 - Enrollees who died.

Please note that because of the nature of the reassessment process, it is not always clear whether disenrollments due to failed assessments should fall under the 'involuntary' or 'voluntary' category. Sites were required to complete a reassessment of each enrollee every six months and if the site failed to do so, the individual was automatically disenrolled.² There was no protocol, however, outlining how many attempts were needed before the site stopped calling, or if reassessment refusals were legitimate when given by respondents other than the actual participant.

Table 4.4 shows the disenrollment experience by site from January 1994 through September 1997. Of the 8,692 people who ever enrolled, 3,228 (37 percent) disenrolled at some point, for a variety of reasons (see Section 4.4.1 below). Of those who disenrolled, 919 (29 percent) subsequently re-enrolled in the CNO. Some of those re-enrolled individuals went on to disenroll a second time; some participants experienced a cycle of up to four disenrollments and re-enrollments over the course of the demonstration.

Carondelet and VNS had the highest rates of disenrollment – 50 percent of Carondelet enrollees and 37 percent of VNS enrollees disenrolled – but again many of those who disenrolled returned to their CNO at a later date. Thirty-five percent of those who disenrolled from Carondelet later re-enrolled, and 29 percent of disenrollees re-enrolled at VNS. At Carle, 29 percent of enrollees disenrolled at some point, while 26 percent of those re-enrolled. LAH shows the lowest disenrollment rate (22 percent) but also the lowest re-enrollment rate (7 percent).

| | Carle (IL) | Carondelet (AZ) | LAH (MN) | VNS (NY) | Total |
|---|------------|-----------------|----------|----------|-------|
| Total number of Treatments ever enrolled in a CNO | 2306 | 2910 | 1949 | 1527 | 8692 |
| Total number of Treatments who ever disenrolled | 659 | 1444 | 431 | 694 | 3228 |
| <i>As a percentage of total number of Treatments ever enrolled</i> | 29% | 50% | 22% | 45% | 37% |
| Total number of disenrolled Treatments that ever re-enrolled | 169 | 511 | 31 | 208 | 919 |
| <i>As a percentage of Treatments who ever disenrolled</i> | 26% | 35% | 7% | 30% | 29% |
| Number of Treatments enrolled as of September 30, 1997 | 1786 | 1716 | 1543 | 979 | 6024 |
| <i>As a percentage of Treatments ever enrolled</i> | 77% | 59% | 79% | 64% | 69% |

Source: Health Care Financing Administration "CNO Enrollment File", Abt Associates Inc.
 Note: Numbers in the "Disenrolled," "Re-enrolled" and "Enrolled as of September 30, 1997" categories do not sum to the "Ever Enrolled" total because of the re-enrollees that disenroll more than one time.

² From January 1994 through January 1995 the reassessment "window" lasted from 15 days after each six-month anniversary of enrollment. In February 1995 this window was extended to 28 days pre- post anniversary in order to give the sites more flexibility in scheduling reassessments.

Figure 4.4 on the next page shows cumulative enrollment and net enrollment by site. Net total enrollment in the CNOs, which is defined as the number of people currently enrolled at any given point in time, increased steadily during the first 18 months of the demonstration. During these early months, recruitment was emphasized by all. Carle, which had prior experience with health services demonstrations and was familiar with its client population, was quickly able to recruit large numbers of enrollees. Carle shows a steeper curve in the early months than do the other three sites, which took a somewhat longer to build enrollment momentum.

As the demonstration progressed, each site manifested different patterns of disenrollment and re-enrollment. At VNS, net enrollment leveled off after March 1995, reaching a high of 1,073 enrollees in October 1996 and gradually declining to a low of 979 enrollees in September 30, 1997. Similarly, LAH net enrollment leveled off after July 1995, hovering between 1,487 and 1,581 until July 1997 and then declining gradually to a low of 1,543 in September 1997. At Carle, net enrollment began to level out in June 1995, varying from 1,656 to 1,793 until July of 1997, and slowly declining to a low of 1,786 in September 30, 1997.

At Carondelet, however, a different pattern is visible. Net enrollment increased steadily until May 1995. After that, a cyclical pattern emerged, with annual peaks in enrollment during winter months and lows during the summer months. This pattern is probably explained by the activity of “snowbirds” who joined the CNO, living in Arizona for the winter but who moved north during the summers. Carondelet reached its peak net enrollment of 1,972 in December of 1995.

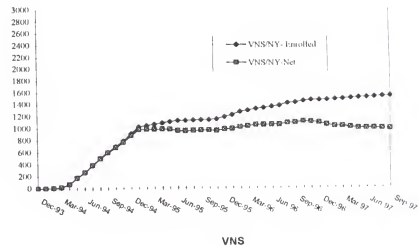
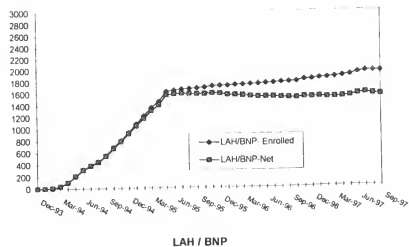
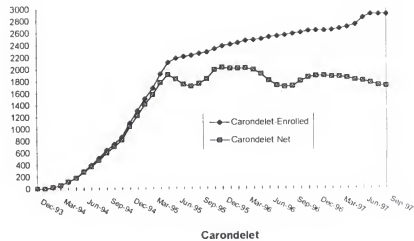
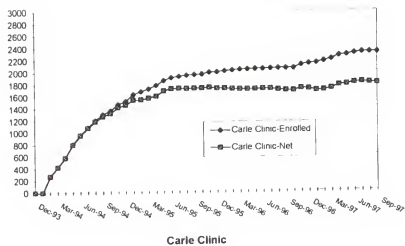
Success in maintaining (and re-enrolling) long-term enrollees can be measured by looking at net enrollment as a percentage of cumulative enrollment. Overall, LAH maintained the highest percentages of currently enrolled participants, as compared to those ever enrolled at the CNO. At the end of September 1997, 79 percent of those ever enrolled in LAH were currently enrolled. Carle showed 77 percent of its “ever-enrolled” members currently enrolled as of September 30, 1997. Carondelet and VNS had lower percentages: VNS showed 64 percent and Carondelet 59 percent of their “ever-enrolled” members currently enrolled. However, since the “snowbirds” were out of the CNO area in August 1997, the figure for Carondelet may err on the low side. Across all four sites, 69 percent of those who ever enrolled in a CNO were currently enrolled as of September 30, 1997.

4.4.1 Reported Reasons at the Time of Disenrollment

The sites reported to HCF on the reasons that their participants disenrolled from the CNO. Table 4.5 presents the overall distribution of these reasons reported at the time of enrollees’ first disenrollment. Overall, a plurality of disenrollments were due to “Relocation Outside the CNO Service Area” (27 percent). Other common reasons given included “Late Assessment” (15 percent), “Voluntary Withdrawal” (12 percent), and “HMO Enrollment” (12 percent).

Each site faced unique challenges in retaining their enrollees. As reported in Section 4.2, Carondelet accounts for the largest portion of first disenrollments, and this high disenrollment rate (40 percent) is mainly due to “snowbird” relocation. The next most common disenrollment reason at Carondelet is enrolling in an HMO. Carondelet faced stiff competition from the abundance of group health care organizations in its area; this accounted for 18 percent of the site’s disenrollees. At VNS, a large portion of disenrollees (40 percent) were forced to disenroll because of late 6-month reassessments.

Figure 4.4: CNO Enrollment and Disenrollment by Site



Managed care organizations provided heavy competition to New York as well, causing 15 percent of VNS disenrollees to leave the CNO, and many of the VNS disenrollees died (14 percent). Voluntary disenrollments account for the largest portion of Carle's first disenrollments (30 percent); relocation and late reassessment also account for many disenrollments (19 percent and 17 percent respectively). At LAH, institutionalization for more than 60 days (24 percent), relocation (23 percent), and death (20 percent) account for a majority of disenrollments.

Table 4.5: Reasons for First Disenrollment

| | Carle (IL) n=659 | Carondelet (AZ) n=1444 | LAH (MN) n=431 | VNS (NY) n=694 | Total n=3228 |
|-------------------------------|---------------------|---------------------------|-------------------|-------------------|-----------------|
| Voluntary Withdrawal | | | | | |
| Voluntary Disenrollment | 30% | 11% | 0.2% | 8% | 13% |
| HMO Enrollment | 0% | 18% | 7% | 15% | 12% |
| Refused Assessment | 1% | 4% | 0.1% | 0.4% | 2% |
| Other | 5% | 6% | 17% | 0% | 6% |
| Involuntary Withdrawal | | | | | |
| Medicare Termination | 1% | 0.2% | 0% | 0.4% | 0.3% |
| Relocation | 19% | 40% | 23% | 11% | 27% |
| Institutionalized 60+ | 11% | 3% | 24% | 9% | 8% |
| Used Hospice Benefit | 6% | 7% | 8% | 3% | 6% |
| ESRD Entitlement | 1% | 0.1% | 1% | 0.3% | 0.4% |
| Late Reassessment | 17% | 8% | 0.5% | 40% | 15% |
| Death | 10% | 7% | 20% | 14% | 11% |

Sources: Health Care Financing Administration; Abt Associates Inc

4.4.2 Baseline Differences between the Continuously Enrolled, Involuntarily Disenrolled, and Voluntarily Disenrolled Applicants

One would hypothesize that baseline differences among CNO applicants might predict their propensity to remain continuously enrolled, or to be disenrolled either voluntarily or involuntarily. To test these expectations, we explored baseline characteristics such as the occurrence of a 'major illness' in the 12 months prior to random assignment, previous utilization of CNO-like services (home nursing care, in-home special physical or occupational therapy, and home health aide or homemaker services), previous utilization of services outside the CNO package (hospital stays, nursing home stays, medical specialist visits, and emergency or urgent care visits), and satisfaction level with prior nurse care.

The results, as seen in Table 4.6, show that there are significant differences in the age, perceptions of health status, and previous use of services included in the CNO package between applicants who

disenrolled and those who were continuously enrolled. Each entry in the table represents the proportion of enrollees with (yes) and without (no) the characteristic in the shaded row that were continuously enrolled, involuntarily disenrolled, and voluntarily disenrolled. For example, among enrollees at Carle who were aged 80 and over at baseline, 62 percent were continuously enrolled through September 1997, 28 percent had been involuntarily disenrolled, and 10 percent had voluntarily disenrolled. Among those under age 80 at baseline, 73 percent were continuously enrolled, 16 percent were involuntarily disenrolled, and 10 percent voluntarily disenrolled. In the case of Carle, the hypothesis that age category and enrollment outcome are related is strongly supported by the chi-square test.

It is evident from the table that the probability of voluntary disenrollment is unrelated to the variables under study. In most cases rates of voluntary disenrollment are nearly identical for the two groups. Statistically significant relationships between the variables under study and enrollment outcomes are likely the result of differences in the probability of continuous enrollment versus involuntary disenrollment.

With the exception of enrollees at Carondelet, those aged 80 and over at baseline were less likely to be continuously enrolled and more likely to have been involuntarily disenrolled than those who were 79 and younger at baseline. A greater proportion of the involuntarily disenrolled reported a 'major illness' in the 12 months before random assignment, while the continuously enrolled were more likely to report no 'major illness.' A history of high utilization of the services in the CNO package also predicted which participants were likely to disenroll involuntarily, and a history of low utilization indicated which participants never left the program. There were no significant differences between these groups regarding satisfaction levels with nursing care, or use of services outside of the CNO package.

Table 4.6: Comparison of Continuously Enrolled (CE), Involuntarily Disenrolled (INV), and Voluntarily Disenrolled (VOL) Enrollees

| | Carle (IL) | | | Carondelet (AZ) | | | LAH (MN) | | | VNS (NY) | | |
|--|-----------------|--------------|--------------|-----------------|--------------|--------------|------------------|--------------|--------------|-----------------|--------------|--------------|
| | CE n=1649 | INV n=426 | VOL n=235 | CE n=1473 | INV n=899 | VOL n=548 | CE n=1523 | INV n=328 | VOL n=105 | CE n=839 | INV n=534 | VOL n=164 |
| Age: 80 + years of age | | | | | | | | | | | | |
| Yes | 0.62 | 0.28 | 0.10 | 0.48 | 0.34 | 0.18 | 0.65 | 0.29 | 0.06 | 0.49 | 0.41 | 0.10 |
| No | 0.73 | 0.16 | 0.10 | 0.51 | 0.30 | 0.19 | 0.84 | 0.11 | 0.05 | 0.58 | 0.31 | 0.11 |
| | $\chi^2 = 60.0$ | | | $\chi^2 = 7.7$ | | | $\chi^2 = 123.7$ | | | $\chi^2 = 29.5$ | | |
| | p = .001 | | | p = .461 | | | p = .001 | | | p = .001 | | |
| Health: Major illness -past 12 months | | | | | | | | | | | | |
| Yes | 0.63 | 0.27 | 0.10 | 0.45 | 0.35 | 0.19 | 0.68 | 0.25 | 0.06 | 0.49 | 0.40 | 0.11 |
| No | 0.73 | 0.17 | 0.10 | 0.52 | 0.29 | 0.19 | 0.70 | 0.25 | 0.05 | 0.56 | 0.34 | 0.11 |
| | $\chi^2 = 23.0$ | | | $\chi^2 = 10.6$ | | | $\chi^2 = 21.7$ | | | $\chi^2 = 3.7$ | | |
| | p = .001 | | | p = .005 | | | p = .001 | | | p = .156 | | |
| Utilization: High use of CNO Services | | | | | | | | | | | | |
| Yes | 0.59 | 0.28 | 0.12 | 0.43 | 0.37 | 0.20 | 0.55 | 0.36 | 0.09 | 0.40 | 0.50 | 0.10 |

Table 4.6: Comparison of Continuously Enrolled (CE), Involuntarily Disenrolled (INV), and Voluntarily Disenrolled (VOL) Enrollees

| | Carle (IL) | | | Carondelet (AZ) | | | LAH (MN) | | | VNS (NY) | | |
|--|----------------------------|--------------|--------------|---------------------------|--------------|--------------|----------------------------|--------------|--------------|----------------------------|--------------|--------------|
| | CE n=1649 | INV n=426 | VOL n=235 | CE n=1473 | INV n=899 | VOL n=548 | CE n=1523 | INV n=328 | VOL n=105 | CE n=839 | INV n=534 | VOL n=164 |
| No | 0.72 | 0.18 | 0.10 | 0.51 | 0.30 | 0.19 | 0.80 | 0.15 | 0.05 | 0.57 | 0.33 | 0.10 |
| | $\chi^2 = 14.9$ $p = .001$ | | | $\chi^2 = 8.0$ $p = .018$ | | | $\chi^2 = 70.5$ $p = .001$ | | | $\chi^2 = 23.5$ $p = .001$ | | |
| Utilization: High Use of Non-CNO Services | | | | | | | | | | | | |
| Yes | 0.72 | 0.19 | 0.10 | 0.50 | 0.31 | 0.19 | 0.76 | 0.19 | 0.05 | 0.56 | 0.35 | 0.10 |
| No | 0.71 | 0.18 | 0.11 | 0.51 | 0.31 | 0.18 | 0.80 | 0.15 | 0.05 | 0.52 | 0.35 | 0.13 |
| | $\chi^2 = .40$ $p = .811$ | | | $\chi^2 = .18$ $p = .917$ | | | $\chi^2 = 5.0$ $p = .083$ | | | $\chi^2 = 3.8$ $p = .152$ | | |
| Satisfaction: Very to Moderately Satisfied w Nurse Care | | | | | | | | | | | | |
| Yes | 0.72 | 0.18 | 0.10 | 0.50 | 0.32 | 0.19 | 0.78 | 0.17 | 0.05 | 0.54 | 0.37 | 0.1 |
| No | 0.60 | 0.28 | 0.12 | 0.54 | 0.27 | 0.19 | 0.75 | 0.16 | 0.09 | 0.55 | 0.34 | 0.11 |
| | $\chi^2 = 9.6$ $p = .008$ | | | $\chi^2 = 4.0$ $p = .138$ | | | $\chi^2 = 4.9$ $p = .088$ | | | $\chi^2 = 1.6$ $p = .454$ | | |

Source: Baseline Assessments

References

- Henry J. Kaiser Family Foundation, Kaiser Commission on Medicaid and the Uninsured, *Medicaid and Uninsured Facts* <http://www.kff.org/state_health/states/il.html>.
- Teitelbaum, M. and DeVito, J. Evaluation of the Community Nursing Organization Demonstration. Annual Report (January - December 1994). Abt Associates Inc., April 1995.
- The Source Book of County Demographics, Ninth Edition; CACI Marketing Systems, 1996.
- U.S. Bureau of the Census, 1990 Census Data <<http://www.census.gov>>.

Appendix 4.A

Table 1: Demographics of Counties Served by Carle Clinic CNO (Illinois)
Counties: Champaign, Coles, McLean, Piatt, Vermillion

| Age ¹ | | Race/ethnicity ¹ | | Income ¹ | | Highest Level of Education Completed ¹ | | Home Ownership ¹ | | Medicaid Enrollment ² |
|---|-------|---|-------|---|-------|---|------------------|---|-------|---|
| Under 50 | 77.1% | Black | 6.7% | Under \$10,000 | 27.2% | Some grammar school | 7.5% | Owner Occupied | 78.7% | Illinois Medicaid enrollees age 65 and over 9.2% |
| 50-64 | 11.5% | White | 90.1% | \$10,000 - \$24,999 | 38.8% | Some high school | 10.4% | Renter Occupied | 21.3% | |
| 65-69 | 3.6% | Other | 3.2% | \$25,000 - \$49,999 | 23.8% | High school graduate | 32.1% | | | |
| 70-79 | 5.0% | Persons of Hispanic Origin (all races) | 1.5% | \$50,000 - \$74,999 | 6.3% | Some college | 18.5% | | | |
| 80-84 | 1.5% | | | \$75,000 or more | 3.9% | Vocational or Associate degree | 6.2% | | | |
| 85 or more | 1.3% | | | | | | College graduate | 14.4% | | |
| | | | | | | Post-college degree | 10.8% | | | |
| Universe: Total Population (1990) n = 457,654 | | Universe: Total Population (1990) n = 457,654 | | Universe: Households, householders age 65 or over (1990) n = 34,010 | | Universe: Persons over age 25 (1990) n = 266,609 | | Universe: Occupied Housing Units, Occupier over age 65 (1990) n = 34,313 | | Universe: Illinois Population Age 65 and over (1994-5) n = 1,383,000 |

¹U.S. Bureau of the Census, 1990 Census Data <<http://www.census.gov>>.

²Henry J. Kaiser Family Foundation, Kaiser Commission on Medicaid and the Uninsured, *Medicaid and Uninsured Facts* <http://www.kff.org/state_health/states/il.html>.

Table 2: Demographics of Counties Served by Carondelet Health Care CNO (Arizona)
Counties: Pima, Santa Cruz

| Age ¹ | | Race/ethnicity ¹ | | Income ¹ | | Highest Level of Education Completed ¹ | | Home Ownership ¹ | | Medicaid Enrollment ² | |
|--|-------|--|-------|---|-------|---|-------|--|-------|--|------|
| Under 50 | 73.9% | Black | 3.0% | Under \$10,000 | 23.5% | Some grammar school | 8.9% | Owner Occupied | 77.2% | Arizona Medicaid enrollees age 65 and over | 4.7% |
| 50-64 | 12.6% | White | 78.5% | \$10,000 - \$24,999 | 37.9% | Some high school | 11.5% | Renter Occupied | 22.8% | | |
| 65-69 | 4.5% | Other | 18.5% | \$25,000 - \$49,999 | 26.6% | High school graduate | 25.1% | | | | |
| 70-79 | 6.3% | Persons of Hispanic Origin (all races) | 26.8% | \$50,000 - \$74,999 | 7.3% | Some college | 24.8% | | | | |
| 80-84 | 1.6% | | | \$75,000 or more | 4.6% | Vocational or Associate degree | 7.1% | | | | |
| 85 or more | 1.1% | | | College graduate | 14.1% | | | | | | |
| | | | | Post-college degree | 8.6% | | | | | | |
| <i>Universe: Total Population (1990)</i> | | <i>Universe: Total Population (1990)</i> | | <i>Universe: Households, householders age 65 or over (1990)</i> | | <i>Universe: Persons over age 25 (1990)</i> | | <i>Universe: Occupied Housing Units, Occupier over age 65 (1990)</i> | | <i>Universe: Arizona Population Age 65 and over (1994-5)</i> | |
| <i>n = 696,556</i> | | <i>n = 696,556</i> | | <i>n = 61,187</i> | | <i>n = 439,682</i> | | <i>n = 62,619</i> | | <i>n = 529,000</i> | |

¹U.S. Bureau of the Census, 1990 Census Data <<http://www.census.gov>>.

²Henry J. Kaiser Family Foundation, Kaiser Commission on Medicaid and the Uninsured, *Medicaid and Uninsured Facts* <http://www.kff.org/state_health/states/az.html>.

Table 3: Demographics of Counties Served by LAH/BNP CNO (Minnesota)

Counties: Hennepin, Isanti, Steele

| Age ¹ | | Race/ethnicity ¹ | | Income ¹ | | Highest Level of Education Completed ¹ | | Home Ownership ¹ | | Medicaid Enrollment ² | |
|--|-------|--|-------|---|-------|---|-------|--|-------|--|-------|
| Under 50 | 76.0% | Black | 5.5% | Under \$10,000 | 23.7% | Some grammar school | 4.5% | Owner Occupied | 69.2% | Minnesota Medicaid enrollees age 65 and over | 11.8% |
| 50-64 | 12.5% | White | 90.0% | \$10,000 - \$24,999 | 38.5% | Some high school | 7.8% | Renter Occupied | 30.8% | | |
| 65-69 | 3.3% | Other | 4.6% | \$25,000 - \$49,999 | 26.1% | High school graduate | 27.0% | | | | |
| 70-79 | 4.9% | Persons of Hispanic Origin (all races) | 1.2% | \$50,000 - \$74,999 | 7.2% | Some college | 21.8% | | | | |
| 80-84 | 1.7% | | | \$75,000 or more | 4.5% | Vocational or Associate degree | 8.2% | | | | |
| 85 or more | 1.6% | | | College graduate | 22.0% | Post-college degree | 8.7% | | | | |
| <i>Universe: Total Population (1995)</i> | | <i>Universe: Total Population (1990)</i> | | <i>Universe: Households, householders age 65 or over (1990)</i> | | <i>Universe: Persons over age 25 (1990)</i> | | <i>Universe: Occupied Housing Units, Occupier over age 65 (1990)</i> | | <i>Universe: Minnesota Population Age 65 and over (1994-5)</i> | |
| <i>n = 1,119,3309</i> | | <i>n = 1,088,451</i> | | <i>n = 80,272</i> | | <i>n = 721,490</i> | | <i>n = 82,258</i> | | <i>n = 482,000</i> | |

¹U.S. Bureau of the Census, 1990 Census Data <<http://www.census.gov>>.

²Henry J. Kaiser Family Foundation, Kaiser Commission on Medicaid and the Uninsured, *Medicaid and Uninsured Facts* <http://www.kff.org/state_health/states/mn.html>.

Table 4: Demographics of Counties Served by VNSNY (New York)
Counties: Queens

| Age ¹ | | Race/ethnicity ¹ | | Income ¹ | | Highest Level of Education Completed ¹ | | Home Ownership ¹ | | Medicaid Enrollment ² | |
|--|-------|--|-------|---|-------|---|-------|--|-------|---|-------|
| Under 50 | 70.1% | Black | 21.7% | Under \$10,000 | 27.2% | Some grammar school | 12.7% | Owner Occupied | 51.1% | New York State Medicaid enrollees age 65 and over | 16.0% |
| 50-64 | 15.2% | White | 57.9% | \$10,000 - \$24,999 | 31.6% | Some high school | 16.2% | Renter Occupied | 48.9% | | |
| 65-69 | 4.7% | Other | 20.4% | \$25,000 - \$49,999 | 25.0% | High school graduate | 29.8% | | | | |
| 70-79 | 6.7% | Persons of Hispanic Origin (all races) | 19.5% | \$50,000 - \$74,999 | 9.6% | Some college | 15.6% | | | | |
| 80-84 | 1.9% | | | \$75,000 or more | 6.7% | Vocational or Associate degree | 5.2% | | | | |
| 85 or more | 1.4% | | | College graduate | 12.5% | | | | | | |
| | | | | Post-college degree | 8.1% | | | | | | |
| <i>Universe: Total Population (1990)</i> | | <i>Universe: Total Population (1990)</i> | | <i>Universe: Households, householders age 65 or over (1990)</i> | | <i>Universe: Persons over age 25 (1990)</i> | | <i>Universe: Occupied Housing Units, Occupier over age 65 (1990)</i> | | <i>Universe: New York State Population Age 65 and over (1994-5)</i> | |
| <i>n = 1,951,598</i> | | <i>n = 1,951,598</i> | | <i>n = 180,492</i> | | <i>n = 1,350,456</i> | | <i>n = 187,798</i> | | <i>n = 2,326,000</i> | |

¹U.S. Bureau of the Census, 1990 Census Data <<http://www.census.gov>>.

²Henry J. Kaiser Family Foundation, Kaiser Commission on Medicaid and the Uninsured, *Medicaid and Uninsured Facts* <http://www.kff.org/state_health/states/ny.html>.

5.0 Health, Functioning and Mortality

5.1 Introduction

Health care providers who bear financial risk under managed care plans have an incentive to furnish fewer services to plan members than they would if operating under a fee-for-service arrangement. Awareness of this incentive, together with anecdotal accounts of “drive-through deliveries” and failure to cover experimental treatments, has fueled a perception that risk-bearing plans may provide lower quality of health care than traditional indemnity plans. The implied corollary of this perception is that adverse health-outcomes may be more common, on average, among enrollees in HMOs and other managed care plans than they otherwise would be. Despite these perceptions, evidence that outcomes are indeed poorer under managed care is hard to find. The well-known Health Insurance Experiment, conducted in the late 1970s, found no health differences between individuals randomly assigned to HMO or fee-for-service plans (Sloss et al. 1987). Similarly, Rogers et al. (1993) found no differences in outcomes by payment source for depressed patients. Scidman, Bass, and Rubin concluded that outcomes of cardiovascular care did not differ for patients treated in HMO and non-HMO settings.

One of the few studies finding an association between capitated care arrangements and poorer health outcomes was that of Shaughnessy, Schlenker and Hittle (1994). They found slightly better health outcomes for Medicare beneficiaries receiving home health services under fee-for-service than for those receiving the same services under risk HMO plans. The authors speculated that the differences in outcomes were produced by a tendency for HMOs to restrict the use of home health visits.

The CNOs shared with other risk-bearing providers the financial incentive to restrict services. On this basis one might hypothesize that some deterioration in health outcomes for the treatment group would be observed despite the weight of empirical evidence that this does not occur. A countervailing force on outcomes is produced by the practice of continuing assessment and nurse case management, which could be expected to result in earlier detection and monitoring of health problems and perhaps, superior outcomes.

In this chapter, four outcome measures, capturing physical and mental health, physical functioning and mortality. Treatment/control contrasts are constructed at three periods following random assignment to gauge the effect of the CNO on individual health and mortality.

5.2 Outcome Measures

The analysis of CNO effects on health and functioning was assessed using three outcome measures constructed from responses to baseline and followup surveys. An additional analysis of death rates among those assigned to treatment and control groups was carried out using the date of death appearing on the Medicare Enrollment Database.

Two outcome measures were calculated from responses to the SF-36, the physical component summary (PCS) and mental component summary (MCS). These measures are weighted aggregates of the eight health status scales derived from the SF-36. The PCS measure weights most heavily the

physical functioning, role-physical, bodily pain, and general health scales. The MCS measure reflects primarily the vitality, general health, role-emotional, and mental health scales. Calculation of the PCS and MCS followed the procedure outlined in Ware, Kosinski and Keller (1994).

The ADL/IADL score is a sum, ranging from 0 to 16, of activities of daily living (ADL) and instrumental activities of daily living (IADL) which the individual can perform independently. The psychometric justification for a scale of this type is given in Spector and Fleishman (1998). Components of the scale are shown in Table 5.1.

Table 5.1: Measures Used in ADL/IADL Outcome Scale

| ADL measure | Independent in: | IADL measure | Independent in: |
|-------------|---------------------------------------|--------------|-----------------------------|
| 1. | Eating | 10. | Preparing meals |
| 2. | Bed transfer | 11. | Doing laundry |
| 3. | Chair transfer | 12. | Doing light housework |
| 4. | Walking around inside | 13. | Shopping for groceries |
| 5. | Going outside | 14. | Managing money/paying bills |
| 6. | Dressing | 15. | Taking medicine |
| 7. | Bathing | 16. | Making telephone calls |
| 8. | Getting to bathroom/using toilet | | |
| 9. | Controlling urination/bowel movements | | |

Sources: Baseline and followup assessments of randomized CNO applicants.

5.3 Analytic Approach

Three change scores, from baseline to 15-month followup, from baseline to 27-month followup and from baseline to 39-month followup, were computed for each of the three survey-based measures — physical component summary (PCS), mental component summary (MCS), and ADL/IADL score. Contrasts for each change score were tested for statistical significance using the standard t-test and the two-sample Wilcoxon rank sum test. For the PCS and MCS, the linear regression equation of the 39-month change score on dummy variables for site and treatment status was also estimated. By forcing the estimated effect of treatment (randomization to CNO) to be identical for all sites, the regression model provides additional statistical power to detect treatment effects. The model achieves this additional power by sacrificing the ability to estimate distinct treatment effects by site.

5.4 Data

CNO applicants were interviewed in person near the time of randomization as described in Chapter 2. The PCS and MCS scales, as well as the ADL/IADL score, were computed using baseline data from

this survey. The scales were recalculated using followup data secured during subsequent interviews conducted 15 months, 27 months, and 39 months after randomization. Dates of death were drawn from the Medicare Enrollment Database. All measures were computed for individuals randomized to treatment or control groups prior to October 1 1995.

5.5 Results

SF-36 Scales

Table 5.2 displays the change in the SF-36 Physical Score, measured from baseline to successive follow-up interviews conducted 15, 27, and 39 months later. Most figures in the table are negative, indicating that physical scores declined on average over the intervening periods. Because all interviewing ceased in December 1997, 39-month followup interviews were conducted only for those randomized before September 1994; 27-month interviews were conducted only with those randomized before September 1995. Consequently the sample sizes decline for later interviews. The table shows little association between assignment to the treatment group and mean improvement or decline at subsequent points. In the three instances in which treatment/control differences were significant at the 0.10 level, all showed superior outcomes for the treatment group.¹ Nevertheless, thirty-nine months after random assignment, no differences between the treatment and control group are statistically significant, even at the ten percent level.

Table 5.2: Mean Change in SF-36 Physical Health Summary Between Baseline and Three Follow-up Interview Points for Treatment and Control Groups, by CNO Site

| | <i>Months after randomization</i> | | | | | |
|------------|-----------------------------------|-------|-----------|---------|-----------|-------|
| | 15 months | | 27 months | | 39 months | |
| | T | C | T | C | T | C |
| Carle | -0.88 | -0.73 | -1.85 | -1.63 | -2.67 | -2.26 |
| n | 1,622 | 746 | 1,166 | 556 | 988 | 448 |
| Carondelet | -0.42 | -0.94 | -0.60 | -0.31 | -2.09 | -1.84 |
| n | 1,731 | 794 | 561 | 252 | 370 | 166 |
| LAH | 0.10 | 0.20 | 0.22 | -0.75 * | -1.12 | -1.25 |
| n | 1,372 | 616 | 591 | 300 | 422 | 194 |
| VNS | -0.38 | -0.54 | -0.99 | -2.11 * | -2.35 | -2.01 |
| n | 708 | 241 | 439 | 141 | 326 | 103 |

** Statistically significant at $p=0.05$ level using t-test.

* Statistically significant at $p=0.10$ level using t-test.

Note: Changes are computed as followup value - baseline value. Positive numbers indicate improvement in score, negative numbers indicate decline.

Sources: Baseline and followup assessments of randomized CNO applicants.

1 Nearly identical results were obtained when tests were conducted using the two-sample Wilcoxon rank-sum test rather than the t-test. Using the Wilcoxon test, the 15-month difference at Carondelet is not significant at the 0.10 level. The 27-month difference at LAH is significant at the 0.05 level. Other results are unchanged.

Change scores for the mental health summary (MCS) over the same three followup periods are shown in Table 5.3. Although the change scores are consistently higher for the treatment group, the differences are never significant at the 0.05 level and only once are significant at the 0.10 level.

Least-squares regression estimates of the regression of 39-month change scores for the PCS and MCS scales are shown in Table 5.4. The absence of a statistically significant effect of assignment to the treatment group on change in physical health as measured by the PCS is unsurprising in light of the earlier results seen in Table 5.2. Nor perhaps is the detection of a statistically *significant* effect of treatment on mental health. The emergence of this effect is clearly the result of aggregation across sites and the consequent increase in total sample size.

Table 5.3: Changes in Sf-36 Mental Health Summary (Mcs) Between Baseline and Three Followup Interview Points for Treatment and Control Groups, by CNO Site

| | Months after randomization | | | | | |
|------------|----------------------------|-------|-----------|-------|-----------|-------|
| | 15 months | | 27 months | | 39 months | |
| | T | C | T | C | T | C |
| Carle | 0.08 | -0.21 | (0.11) | 0.08 | -0.52 | -1.11 |
| n | 1,622 | 746 | 1,166 | 556 | 988 | 448 |
| Carondelet | 0.53 | 0.29 | 0.56 | -0.56 | 0.43 | -0.63 |
| n | 1,731 | 794 | 561 | 252 | 370 | 166 |
| LAH | 0.33 | -0.03 | -0.48 | -0.83 | -0.47 | -1.60 |
| n | 1,372 | 616 | 591 | 300 | 422 | 194 |
| VNS | 0.57 | -0.33 | 0.02 | -1.54 | -1.33 | -1.65 |
| n | 708 | 241 | 439 | 141 | 326 | 103 |

** Statistically significant at p=0.05 level.

* Statistically significant at p=0.10 level.

Note: Changes are computed as followup value - baseline value. Positive numbers indicate improvement in score; negative numbers indicate decline.

Sources: Baseline and followup assessments of randomized CNO applicants.

Table 5.4: OLS Regression Estimates for 39-Month Change in PCS and MCS Scores

| | PCS | | MCS | |
|------------|-------------|-----------|-------------|-----------|
| | Coefficient | Std error | Coefficient | Std error |
| Intercept | -2.84 | 0.35 | -1.01 | 0.30 |
| TREAT | -0.26 | 0.36 | 0.77 | 0.32 |
| Carondelet | 0.64 | 0.46 | 0.75 | 0.40 |
| LAH | 1.56 | 0.44 | -0.15 | 0.38 |
| VNS | 0.28 | 0.50 | -0.72 | 0.44 |
| R2 | 0.01 | | 0.01 | |
| n | 3017 | | 3017 | |

Sources: Regression analysis of baseline and followup survey data.

The ADL/IADL Scale

The effects of the CNO on functional ability as measured by changes in the ADL/IADL scale are shown in Table 5.5. In three of the four sites, there is virtually no difference between treatment and control groups in ADL/IADL change over time. None of the observed differences for these sites is significant even at the 0.20 level. For VNS, however, the picture is quite different. Not only is the mean level of decline much greater than in the other sites, it is also substantially greater for the control than for the treatment group. This treatment/control difference is statistically significant at the 0.05 level for the 27-month and 39-month followup periods.

Table 5.5: Mean Change in Adl/iadl Total Score Between Baseline and Three Followup Interview Points for Treatment and Control Groups, by CNO Site

| | Months after randomization | | | | | |
|------------|----------------------------|---------|-----------|----------|-----------|----------|
| | 15 months | | 27 months | | 39 months | |
| | T | C | T | C | T | C |
| Carle | 0.01 | 0.06 | -0.13 | -0.06 | -0.34 | -0.31 |
| n | 1,735 | 792 | 1,252 | 591 | 1,058 | 477 |
| Carondelet | -0.07 | -0.12 | -0.20 | -0.24 | -0.48 | -0.59 |
| n | 1,885 | 877 | 628 | 282 | 399 | 178 |
| LAH | -0.04 | -0.03 | -0.24 | -0.26 | -0.50 | -0.50 |
| n | 1,490 | 671 | 652 | 329 | 466 | 212 |
| VNS | -0.15 | -0.43 * | -0.24 | -0.67 ** | -0.79 | -1.39 ** |
| n | 831 | 311 | 499 | 171 | 381 | 140 |

** Statistically significant at p=0.05 level using t test.

* Statistically significant at p=0.10 level using t test.

Note: Changes are computed as followup value - baseline value. Positive numbers indicate improvement in score, negative numbers indicate decline.

Sources: Baseline and followup assessments of randomized CNO applicants.

Mortality

The incidence of mortality among the treatment and control groups for each of the CNO sites is shown in Table 5.6. Mortality was similar, in general, for the treatment and control groups. The clear exception was at VNS, where deaths per person-month were 22 percent higher among the treatment group, although this difference was not statistically significant.² As we shall see, the pattern of mortality across the four CNO sites creates a difficulty in interpreting the ADL/IADL results presented above.

2 The confidence interval for the rate ratio (RR) is computed as $EXP[\ln(\hat{RR}) \pm 1.96 SE]$ where \hat{RR} is the estimated rate ratio and SE is its standard error. See Rothman (1986) which also provides the formula for the pooled Mantel-Haenszel estimate.

Table 5.6: Mortality in the Four CNO Sites

| | Treatment | Control |
|--|-----------|---------|
| Carle | | |
| Deaths | 145 | 76 |
| Person-months at risk | 75,479 | 35,578 |
| Deaths per 10 ³ person months | 1.92 | 2.14 |
| Carondelet | | |
| Deaths | 247 | 136 |
| Person-months at risk | 75,153 | 38,032 |
| Deaths per 10 ³ person months | 3.29 | 3.58 |
| Living at Home | | |
| Deaths | 164 | 81 |
| Person-months at risk | 58,506 | 28,899 |
| Deaths per 10 ³ person months | 2.80 | 2.80 |
| VNS | | |
| Deaths | 172 | 71 |
| Person-months at risk | 40,951 | 20,689 |
| Deaths per 10 ³ person months | 4.20 | 3.43 |

Rate ratios (treatment/control) for beneficiary mortality

| | Rate Ratio | Standard error | 95% Confidence interval | |
|--------------------------|------------|----------------|-------------------------|--------|
| Carle | 0.899 | 0.142 | (0.681, | 1.187) |
| Carondelet | 0.919 | 0.107 | (0.746, | 1.133) |
| Living at Home | 1.000 | 0.136 | (0.766, | 1.305) |
| VNS | 1.224 | 0.141 | (0.928, | 1.614) |
| Pooled (Mantel-Haenszel) | 0.992 | 0.064 | (0.875, | 1.125) |

Sources: Medicare Enrollment Database

5.6 Discussion

Three years after random assignment, the physical health of Medicare beneficiaries assigned to the treatment (CNO) group, as measured by the physical component summary (PCS) of the SF-36 was not different from that of the control group. There is no reason to believe that nurse case management, the practice of periodic in-person assessment, or other interventions carried out by the CNOs led to any improvement in physical health. Nor is there any evidence that physical health of the treatment group deteriorated relative to that of the control group.

Over the same period, assignment to the treatment group was associated with consistent and statistically significant improvements in mental health, as measured by the mental component summary (MCS) of the SF-36. The overall decline in mental health scores for both treatment and control groups combined was quite small, averaging about one point, or two percent of the typical baseline score of 50 or so. Hence the treatment effect, equal to about three-quarters of a point, may not be clinically meaningful. Nevertheless, the issue bears further investigation. It is possible that the periodic assessments and the continuing availability of contact with the CNOs, by telephone or at some other location, is a source of reassurance for many enrollees, producing a small increment to the MCS.

The issue of ADL/IADL performance is the most difficult matter to address here. In three of the four sites — Carle, Carondelet, and LAH — changes over time in ADL/IADL performance were practically identical for the treatment and control groups. At VNS, however, a marked and statistically significant positive effect of treatment was identified. A straightforward conjecture is that something about the activities carried out by VNS produced a beneficial effect on functional independence or that the population applying to the CNO in New York was especially well-suited to benefit from the CNO. The pattern of mortality among treatment and control groups across the four sites suggests a second hypothesis. Recall from Table 5.6 that mortality for the treatment group at VNS was some 22 percent higher than for the control group. Because this difference was not statistically significant, one cannot conclude that a population of individuals enrolled in CNO at VNS would experience higher mortality than would an identical group who was not enrolled. But the higher mortality *in the sample* raises the possibility of so-called informative censoring.

If the death rate is the same for treatment and control groups or if the probability of death is unrelated to outcome measures of interest, then loss of followup data (censoring) due to death will not create analytic difficulties. However, if the death rate is higher for one group and if individuals who die, would, had they lived, have exhibited greater-than-average declines in ADL/IADL performance, then treatment/control differences in outcome measures may be biased despite random assignment. In this instance, it is reasonable at least, to suggest that the observed decline in ADL/IADL scores for the treatment group at VNS is not as great as it would have been if the death rate had been the same for the treatment and control group. It is possible, then, that the observed positive CNO effect at VNS is an artifact of higher mortality in the treatment sample. Whether the observed result is genuine or the result of censoring cannot be ascertained at this point.

Broadly speaking, then, our conclusions regarding the effect of the CNO on individual outcomes echo those of the authors cited in the introduction to this chapter. There is no solid evidence, positive or negative, of an effect of the CNO on physical health, measured by the PCS scale or by observed mor-

tality. At one site, VNS, functional ability, as measured by a combined ADL/IADL scale, appeared to be enhanced by the CNO, although it was impossible to state definitively that this was a direct result of the intervention. Finally, there was a small but consistent beneficial effect of the CNO on mental health. This latter effect is believed to be genuine because of its uniformity across all four CNO sites.

5.7 References

Rothman, Ken. *Modern Epidemiology*. Boston: Little, Brown, and Co 1986.

Rogers, WH, KB Wells, LS Meredith et al. Outcomes for adult outpatients with depression under prepaid or fee-for-service financing. *Archives of General Psychiatry* 50 (July 1993):

Seidman, Joshua, Eric Bass, and Haya Rubin. Review of studies that compare the quality of cardiovascular care in HMO versus non-HMO settings. *Medical Care* 36 (December 1998): 1607-25.

Shaughnessy, Peter, Robert Schlenker and David Hittle. Home health care outcomes under capitated and fee-for-service payment. *Health Care Financing Review* 16 (Fall 1994): 187-222.

Sloss, EM, EB Keeler, RH Brook et al. Effect of a health maintenance organization on physiologic health: Results from a randomized trial. *Annals of Internal Medicine* 106 (January 1987):

Spector, William, and John Fleishman. Combining activities of daily living with instrumental activities of daily living to measure functional disability. *Journal of Gerontology: SOCIAL SCIENCES* 53 (1998): S46-S57.

Ware, John, Mark Kosinski, and Susan Keller. *SF-36 physical and mental health summary scales: a users manual*. Boston: Health Assessment Lab, 1994.

6.0 Results: Satisfaction, Health Knowledge and Preventive Care

6.1 Introduction

This chapter examines the hypothesis that the Community Nursing Organization (CNO) programs can produce measurable improvements in participants' awareness of their health and preventive care, while increasing their satisfaction with health services. A fundamental principle underlying this hypothesis is that the services delivered by the CNO are superior in educational content and in addressing the patient's needs than the services received by applicants in the control group. The periodic assessments carried out by the CNOs provide regular opportunities to assess the results of the CNO's interaction and instruction. To the extent that the quantity and appropriateness of health services and educational outreach are enhanced as a result of the CNO *and* to the extent that outcomes are sensitive to these interactions, enrollee knowledge of health, their participation in preventive care activities, and their satisfaction are expected to increase.

6.2 Outcome Measures

The analysis of effects of CNO enrollment on individual health knowledge, participation in preventive care activities, and satisfaction is based on measures elicited from CNO applicants at the time of their 27 month follow-up interview, and again at the 39 month follow-up interview. The later assessment periods were chosen because the applicants' responses in these surveys would reflect the effects of a longer amount of exposure to the CNO. Satisfaction with health care is measured using responses to several questions regarding the quality and availability of health care. Applicants' awareness of health conditions and their use of preventive activities are assessed using various questions in the Health Risk Appraisal.

6.3 Analytic Approach

The primary method for assessment of CNO effects is the examination of contrasts between treatment and control groups and the change in outcome measures at the 27 and 39 month follow-up interviews. Random assignment assures that this comparison provides an unbiased estimate of the effect of assignment to the treatment group. The statistical significance of differences between treatment and control groups were assessed using parametric (t and χ^2) tests.

6.4 Data

CNO treatments and controls who were randomized between December 1993 and September 1995 were considered for these analyses (n= 4,014). All of these individuals would have been eligible to receive at least two follow-up assessments. The treatment group was limited by excluding individuals who did not receive a baseline assessment and including only those treatments who were currently enrolled in the CNO at the time of each assessment. The control group was not limited. The advantage of using the "Actually Treated" sample is that it maximizes the possibility of detecting a

treatment effect if one exists. However, if an effect is detected, it cannot be stated with confidence whether it was a result of the treatment or of selection bias.

6.5 Results

Preventive Care and Health Promotion Activities

Each CNO had its own strategy in disseminating information on health promotional activities and instructing their enrollees in preventive care. Below is an overview of each site's methods:

Carle

In addition to encouraging preventive care and providing health information at the time of assessments, Carle implemented monthly and quarterly newsletters which featured health education topics and activities available in the community. An annual survey was sent to enrollees to determine which education topics most interested them and to help in planning future health promotion events. In addition, the CNO worked with local colleges and community organizations to hold an annual Health Fair and several health education sessions on arthritis, hospice care, managing chronic pain, and physician/patient relationships.

Carondelet

Carondelet CNO, facing stiff competition from local HMOs, developed a wide range of health promotion activities as one means of differentiating itself from look-alike competitors. The CNO's Health Education Coordinator, along with CNO nurses, helped organize several monthly presentations focusing on topics including exercising safely, healthy eating, and stress management. Special classes, seminars with guest speakers, and social events were held throughout each year. Videos were made of the presentations so that housebound enrollees could benefit as well. Each year, health screenings were held at various community sites. In addition, a monthly newsletter and an annual survey of health education topics of interest were sent out to all enrollees. Volunteers assisted in the organization of these activities.

LAH

At the LAH/BNP CNO, each subsite organized several monthly educational and social events, inviting guest speakers and featuring topics such as Tai Chi, eye care, and personal safety. Community coordinators organized walking clubs and support groups for weight loss and other concerns. These activities were very popular because they became opportunities for enrollees to socialize with other seniors. Additionally, several health screenings and flu clinics were held throughout the year. As at the other sites, an annual survey was sent to enrollees about which health education topics most interested them. A quarterly newsletter tried to convey the impression of a social, club-like atmosphere at the CNO, in order to provide appealing incentives for low-risk seniors to remain involved in the organization. Volunteers played a major role in organizing and implementing these activities.

VNSNY

As noted in the 1995 Annual Report (Teitelbaum & Thomas), VNSNY enrollees were less interested in prevention, health promotion, and wellness when compared to the enrollees at the other sites. Still, VNSNY CNO nurses attempted to reach out to enrollees by giving frequent

presentations at community sites on topics ranging from memory loss to insomnia. Flu clinics were held in the fall of each year. An annual survey elicited enrollee input on health topics of interest, and the monthly newsletter listed health and wellness activities sponsored by local organizations as well as the CNO nurses' presentations.

Preventive health care behaviors of the treatment and control groups were surveyed at the 27 and 39 month follow-up interviews. Behaviors analyzed in this chapter are:

- The amount of information applicants recalled receiving on nutrition and eating healthier.
- The reported change in applicants' smoking habits.
- The amount of time applicants wear seat belts.
- The receipt of a flu shot in the past year, and
- The amount of exercise done each week.

As seen in Table 6.1, the proportion of individuals who reported receiving information on nutrition and healthier eating is significantly higher for the treatment group than the control group at both the 27 and the 39 month survey. None of the other available survey items yielded significant differences between treatment and control groups. In the cases of smoking behavior and receipt of a flu shot, the treatment group showed slight gains over time; still, none of these differences were significant, even at the 0.15 level.

Treatment and control groups were surveyed regarding their health knowledge at the 27 and 39 month follow-up interviews in terms of:

- The applicants' knowledge of their own blood pressure,
- The applicants' knowledge of their own cholesterol level,
- The applicants' overall assessment of 'health symptoms and conditions,' and
- The applicants' assessment of their understanding of medication prescribed to them.

The results of this analysis are detailed in Table 6.2. The most dramatic of the differences between the control and the treatment group is in the knowledge of blood pressure. A much greater proportion of respondents in the CNO treatment group than in the control group said they knew their blood pressure at both 27 and 39 month follow-up surveys. The proportion of treatment group members reporting 1) knowledge of cholesterol levels, 2) their health conditions and symptoms, and 3) an understanding of medications prescribed are slightly higher than the proportion of the control group, but none of these results are significantly different.

Table 6.1: Proportion of Treatment and Control Groups with Aspects of Preventive Care 27 and 39 Months after Random Assignment

I have received information in the last six months about nutrition and eating healthier

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|----------|--------------------|----------|
| Treatment | 17.3 | | 21.6 | |
| Control | 9.8 | | 16.2 | |
| n | 4014 | p= .0001 | 2962 | p= .0004 |

My daily smoking habits include smoking one or more cigars, pipes, cigarettes, or the use of smokeless chewing tobacco.

| | | | | |
|-----------|------|----------|------|----------|
| Treatment | 5.3 | | 4.3 | |
| Control | 5.1 | | 5.1 | |
| n | 4014 | p= .7343 | 2962 | p= .3426 |

I wear my seat belt more than 50% percent of the time

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|----------|--------------------|--|
| Treatment | 84.4 | | NA | |
| Control | 84.5 | | NA | |
| n | 4014 | p= .8951 | NA | |

I received a 'flu' shot in the past year.

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|----------|--------------------|----------|
| Treatment | 81.6 | | 84.9 | |
| Control | 81.1 | | 83.5 | |
| n | 4014 | p= .7042 | 2962 | p= .3451 |

I exercise at least three times per week.

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|----------|--------------------|----------|
| Treatment | 47.5 | | 50.3 | |
| Control | 45.1 | | 47.6 | |
| n | 4014 | p= .1436 | 2962 | p= .1698 |

Table 6.2: Proportion of Treatment and Control Groups with Aspects of Health Knowledge 27 and 39 Months after Random Assignment

I have knowledge of my blood pressure

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|---------|--------------------|---------|
| Treatment | 66.6 | | 67.7 | |
| Control | 60.4 | | 61.7 | |
| n | 4014 | p= 0001 | 2965 | p= 0014 |

I have knowledge of my cholesterol.

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|---------|--------------------|--|
| Treatment | 42.2 | | NA | |
| Control | 41.6 | | NA | |
| n | 4014 | p= 7262 | NA | |

I know about my own health symptoms and conditions.

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|----------|--------------------|---------|
| Treatment | 95.6 | | 96.8 | |
| Control | 95.3 | | 95.9 | |
| n | 2965 | p= .6678 | 2786 | p= 0897 |

I have a good understanding of the purpose of the medication my doctor has prescribed.

| | 27 Month Follow-up | | 39 Month Follow-up | |
|-----------|--------------------|----------|--------------------|--|
| Treatment | 84.3 | | NA | |
| Control | 82.2 | | NA | |
| n | 3790 | p= .1017 | NA | |

Satisfaction

Individual satisfaction with the health care received from providers was gauged by an examination of respondent agreement with several statements about their care at the 27 and 39 month assessment. The statements concern seven dimensions of satisfaction with health care and providers:

- Time spent by providers.
- Satisfaction with care received from home nursing care.
- Opportunity to participate in decision making.
- Courtesy and respect shown by providers.
- Satisfaction with care and assistance from nurses.
- Overall satisfaction with health care services, and
- Confidence that needed care is available.

CNO applicants' responses to these survey statements concerning the perceived quality of health care and health care providers are shown in Table 6.3 and 6.4. While it is clear that the opinions elicited 27 months after random assignment show slight increases in satisfaction for the treatment groups, none of the difference are statistically significant. After 39 months of enrollment, there is the same general trend where the proportion of applicants in the treatment group demonstrate higher satisfaction levels than the control group. Differences in satisfaction with home health care and with the opportunity to participate in health care decisions between the treatment and control group are statistically significant. These results must be interpreted with caution: while it is tempting to state that the increasing levels of satisfaction for the treatment group is due to a longer exposure to CNO services, we cannot be sure that these results are caused by eliminating the disenrollees, who may be less interested in health education.

6.6 Discussion

Twenty-seven months after random assignment, there is no firm evidence to suggest that health education or satisfaction outcomes associated with the CNO are superior to those experienced by the control group. This result, while perhaps discouraging for the CNOs, was not surprising. The primary interventions employed by the CNO, case management and periodic assessment, have not been shown to improve outcomes in the general elderly population. As we have seen, CNO applicants are probably healthier than most Medicare beneficiaries. Few interventions of any sort have been found to markedly improve the health outcomes for elderly individuals. To our knowledge, organizational interventions not targeted to specific groups of individuals have not been shown to enhance outcomes for the over-65 population.

Individuals enrolled at the CNO sites 39 months following their assignment to the treatment group reported significantly greater satisfaction on two measures: nursing care and participation in decisions regarding their health care. These changes may be attributable to CNO performance, however, those that were not satisfied may have disenrolled by the 39 month follow up, skewing the data.

Managed care plans in general, whether Medicare risk plans or private HMOs, are not and have never been judged by their ability to produce outcomes that are superior to those observed under fee-for-service care. The standard for care has been to produce outcomes that are *not* demonstrably worse than generated under fee-for-service. Analyses including the final follow-up data, almost three years after enrollment, prove that CNOs have met this standard.

Table 6.3: Percent Reporting Differing Levels of Satisfaction with Health Care: 27 Month Follow-up

| <i>The amount of time I have with health care professionals when I need care is about right for me</i> | | | | | | |
|--|----------------|----------------|-----------|-------------------|-------------------|----------------|
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 75.0 | 18.9 | 1.0 | 3.5 | 1.6 | $\chi^2=1.784$ |
| Control | 73.9 | 19.0 | 1.2 | 3.9 | 2.1 | $p= .775$ |
| n | 2694 | 683 | 37 | 132 | 36 | 3582 |

| <i>In the past six months I have received home nursing care and I am:</i> | | | | | |
|---|----------------|----------------------|--------------------|--------------------|-----------------|
| | Very satisfied | Moderately satisfied | Somewhat satisfied | Not very satisfied | |
| Treatment | 88.9 | 8.8 | 0.9 | 1.4 | $\chi^2= 1.739$ |
| Control | 88.9 | 11.1 | 0.0 | 0.0 | $p= .628$ |
| n | 248 | 26 | 2 | 3 | 279 |

| <i>I have the opportunity to participate in decisions regarding the health care I receive</i> | | | | | | |
|---|----------------|----------------|-----------|-------------------|-------------------|-----------------|
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 82.0 | 14.3 | 0.6 | 1.9 | 1.2 | $\chi^2= 3.863$ |
| Control | 81.5 | 13.9 | 1.0 | 2.6 | 1.0 | $p= .425$ |
| n | 2968 | 513 | 27 | 78 | 41 | 3627 |

| <i>The health care professionals I know are friendly, courteous, and respect my privacy.</i> | | | | | | |
|--|----------------|----------------|-----------|-------------------|-------------------|----------------|
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 91.2 | 6.8 | 0.4 | 1.2 | 0.4 | $\chi^2=7.981$ |
| Control | 89.1 | 9.3 | 0.3 | 0.9 | 0.3 | $p= .092$ |
| n | 3323 | 282 | 14 | 41 | 13 | 3673 |

| <i>I am satisfied with the care and assistance I have received from nurses.</i> | | | | | | |
|---|----------------|----------------|-----------|-------------------|-------------------|----------------|
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 90.5 | 6.9 | 0.8 | 1.1 | 0.7 | $\chi^2=8.891$ |
| Control | 87.5 | 9.2 | 1.4 | 1.2 | 0.8 | $p= .064$ |
| n | 3202 | 274 | 35 | 40 | 26 | 3577 |

| <i>Overall, how would you rate the health care services you receive.</i> | | | | | | |
|--|-----------|-----------|------|------|------|----------------|
| | Excellent | Very good | Good | Fair | Poor | |
| Treatment | 44.8 | 41.0 | 11.6 | 1.8 | 0.7 | $\chi^2=6.201$ |
| Control | 44.9 | 40.8 | 11.2 | 2.8 | 0.3 | $p= .185$ |
| n | 1651 | 1505 | 422 | 80 | 22 | 3680 |

| <i>How confident are you of getting health care services if and when you need them?</i> | | | | | |
|---|----------------|--------------------|--------------------|----------------|--|
| | Very confident | Somewhat confident | Not very confident | | |
| Treatment | 76.2 | 20.3 | 3.5 | $\chi^2= 1.42$ | |
| Control | 75.7 | 20.8 | 3.5 | $p= .931$ | |
| n | 2782 | 750 | 121 | 3653 | |

Table 6.4: Percent Reporting Differing Levels of Satisfaction with Health Care 39 Month Follow-up

| <i>The amount of time I have with health care professionals when I need care is about right for me</i> | | | | | | |
|--|----------------|----------------------|--------------------|--------------------|-------------------|----------------|
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 76.5 | 16.7 | 1.2 | 3.9 | 1.7 | $\chi^2=2.310$ |
| Control | 75.9 | 17.5 | 1.7 | 3.1 | 1.8 | p= 679 |
| n | 2017 | 448 | 37 | 96 | 46 | 2544 |
| <i>In the past six months I have received home nursing care and I am:</i> | | | | | | |
| | Very satisfied | Moderately satisfied | Somewhat satisfied | Not very satisfied | | |
| Treatment | 86.9 | 10.6 | 1.3 | 1.3 | | $\chi^2=7.81$ |
| Control | 72.3 | 17.0 | 6.4 | 4.3 | | p= 05 |
| n | 173 | 25 | 5 | 4 | | 207 |
| <i>I have the opportunity to participate in decisions regarding the health care I receive.</i> | | | | | | |
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 81.9 | 14.1 | 0.6 | 2.0 | 1.4 | $\chi^2=9.715$ |
| Control | 78.6 | 15.3 | 1.6 | 2.5 | 2.1 | p= 046 |
| n | 2162 | 387 | 25 | 58 | 44 | 2676 |
| <i>The health care professionals I know are friendly, courteous, and respect my privacy</i> | | | | | | |
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 91.4 | 6.2 | 0.2 | 1.1 | 0.4 | $\chi^2=3.588$ |
| Control | 90.3 | 7.9 | 0.3 | 1.1 | 0.3 | p= 465 |
| n | 2488 | 185 | 6 | 30 | 10 | 2719 |
| <i>I am satisfied with the care and assistance I have received from nurses.</i> | | | | | | |
| | Strongly agree | Slightly agree | Uncertain | Slightly disagree | Strongly disagree | |
| Treatment | 89.8 | 7.6 | 1.3 | 0.8 | 0.6 | $\chi^2=6.251$ |
| Control | 86.5 | 10.0 | 1.7 | 1.0 | 0.7 | p=.181 |
| n | 2359 | 222 | 38 | 23 | 16 | 2658 |
| <i>Overall, how would you rate the health care services you receive</i> | | | | | | |
| | Excellent | Very good | Good | Fair | Poor | |
| Treatment | 44.6 | 41.6 | 11.4 | 1.4 | 1.0 | $\chi^2= 713$ |
| Control | 43.5 | 42.9 | 11.5 | 1.3 | 0.8 | p= 950 |
| n | 1202 | 1142 | 311 | 37 | 25 | 2717 |
| <i>How confident are you of getting health care services if and when you need them?</i> | | | | | | |
| | Very confident | Somewhat confident | Not very confident | | | |
| Treatment | 77.5 | 19.2 | 3.3 | | | $\chi^2=2.265$ |
| Control | 75.1 | 21.7 | 3.2 | | | p= 322 |
| n | 2085 | 545 | 89 | | | 2719 |

7.0 Utilization

7.1 Overview

This chapter addresses the question of how enrollment in the Community Nursing Organization (CNO) Demonstration affected the utilization of health services by beneficiaries. Since CNO enrollment was intended to improve care management, reduce inappropriate incentives, and improve health status and satisfaction, one might expect utilization of CNO-covered services to have been lower for the treatment group than for the control group. Furthermore, for the same reasons, if the treatment group developed fewer and less severe health problems than the control group, one would expect utilization of non-CNO services to have been lower for the treatment group as well. On the other hand, since sites were responsible for the cost of all CNO-covered services provided to enrollees, one might expect that some sites would minimize their costs by directing beneficiaries to providers of non-CNO services to obtain care that might otherwise be provided by a nurse or therapist. If such "cost-shifting" occurred, one would expect utilization of non-CNO services to be higher for the treatment group than for the control group. Finally, since the CNO was a new experience for enrollees, one might expect the sites to achieve some additional economies as beneficiaries became more comfortable with CNO staff and procedures.

To test these expectations, this chapter explores data from several sources. First, the sites maintained timesheet records that can be used to obtain a site-level view of how CNO staff spent their time. This investigation is concerned with whether efficiencies emerged over time as enrollees became more familiar with CNO staff and procedures. Second, both treatment and control groups were surveyed repeatedly throughout the demonstration. These surveys asked each respondent to recall which of several types of health services they received in the prior six months as well as how much of each service. Due to the uncertain nature of recollections, the responses to these questions are best used as a supplement to the third source of data, actual Medicare claims and CNO utilization records. These records determine definitively whether the treatment or control group had higher utilization of both CNO-covered and non-CNO services or if there was no systematic difference.

Taken as a whole, these data indicate that the CNO affected neither utilization of CNO-covered services nor non-CNO services, and the sites did not appear to have realized efficiency gains after the first few months.

7.2 Timesheet Records

7.2.1 Overview

This section analyzes data from the timesheet records kept by each CNO site. These records can help answer the question of whether longer length of enrollment in a CNO was associated with a less costly pattern of utilization. Specifically, one might expect a CNO to attempt to substitute less costly beneficiary contacts via telephone for in-person home visits, reducing travel time as well as home visit time. Since beneficiaries might prefer in-person contact initially, these changes might occur gradually, as larger numbers of enrollees became comfortable with CNO staff contact over the

telephone. Because substitutions like this would allow the CNO to be more efficient, one would expect the total number of nurse hours spent per enrollee to decline over time.

We found that although total hours per enrollee declined during the first 17 months, these gains in efficiency were probably due to economies of scale associated with growing enrollments. Once enrollments stabilized, hours per enrollee also stabilized. Furthermore, in later months the composition of services did not change as expected, the proportion of time spent on home visits and accompanying travel continued to grow rapidly at most sites while the proportion of time spent on phone contact did not.

7.2.2 Results

We began this analysis with some figures that established basic facts about enrollment, hours spent by nurses, and hours spent by nurses per enrollee. We then decomposed total nurse hours from two sites into various categories to explore compositional changes.

Figure 7.1 charts total enrollment at each site by month after the demonstration started (January 1, 1994). The figure indicates that after a period of sometimes very rapid growth, enrollment stabilized for each site at approximately month 15. The figure illustrates that the Visiting Nurse Service of New York (VNS) (New York, NY) reached peak enrollment at a lower level than the other sites. Total hours are displayed in Figure 7.2, exhibiting more volatility and less pronounced growth than enrollment at each site, particularly at Carondelet Health Care (Tucson AZ) where hours were extremely volatile. Due to a record keeping problem at Carle Clinic (Urbana IL), the figure shows a sudden, temporary drop in hours at Carle in the middle of the demonstration that did not in fact occur.

Total hours divided by total enrollment provides the first test of whether enrollment in a CNO reduced utilization over time. Figure 7.3 charts total hours per enrollee against months since January 1994 for each site. Confusion could arise from the substantial economies of scale realized during the start-up period when each site was heavily occupied recruiting and assessing new enrollees. As enrollment grew during this period, hours per enrollee fell dramatically. To avoid this confusion and focus on potential effects of treatment on utilization, the time scale in Figure 7.3 does not start until 15 months after start-up. After that time, the figure shows very little improvement in hours spent per enrollee, suggesting little efficiency gain from prolonged enrollment.

The next step was to decompose total hours spent at each site into eight mutually exclusive categories:

- Baseline assessments
- Periodic reassessments
- Documentation
- Phone contacts and other visits
- Home visits
- Travel
- Meetings and conferences
- All other time

Figure 7.1

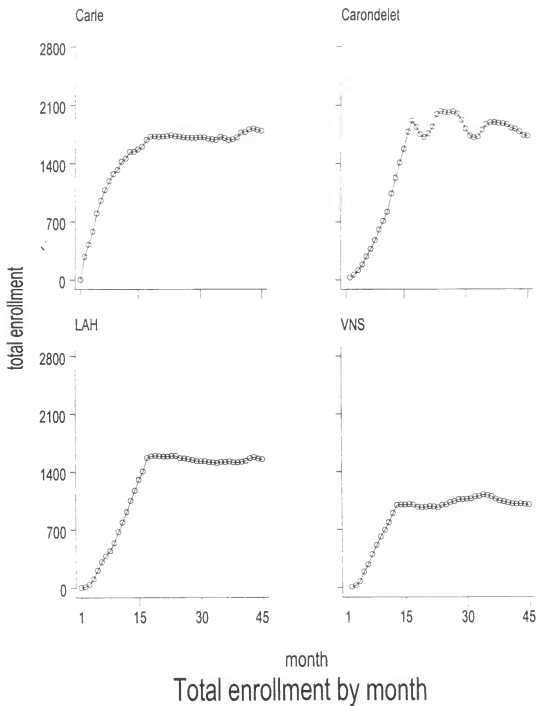


Figure 7.2

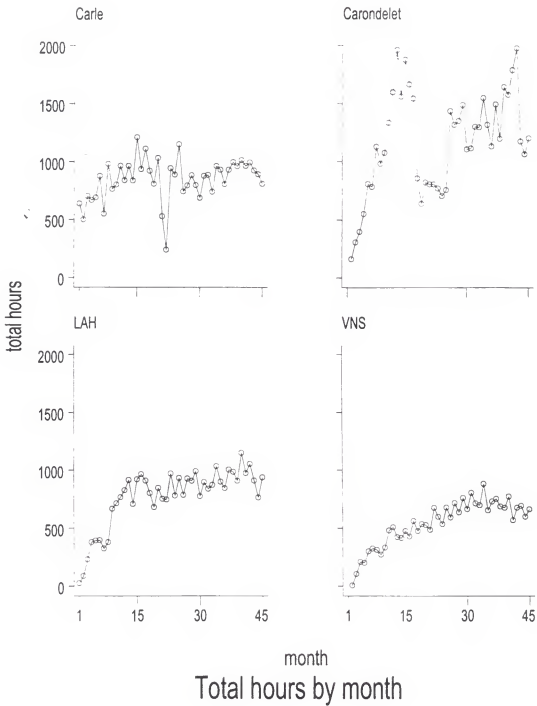


Figure 7.3

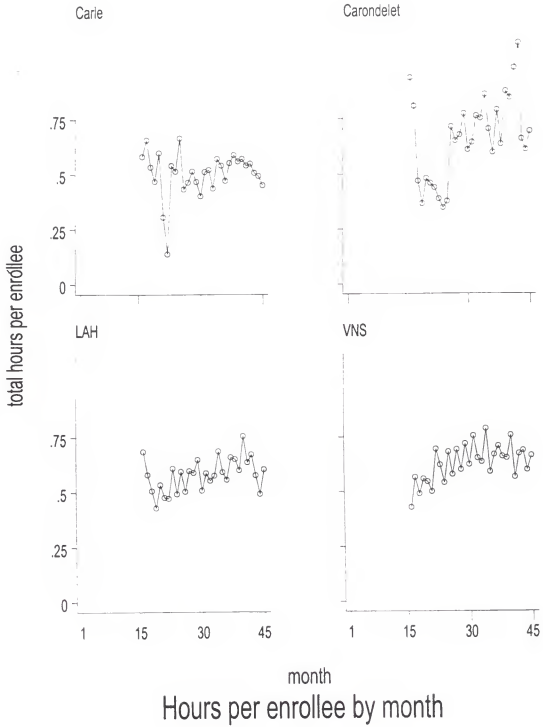


Table 7.1 lists proportions of staff time for two sites in the first seven of these categories at two points in time, 17 and 41 months after start-up. Due to record-keeping problems, only Carle Clinic (Urbana IL) and the Living at Home/Block Nurse Program (LAH) (Minneapolis MN) were suitable for this analysis. As indicated by the table, these seven categories accounted for over 98% of all staff time in both of these months. The third column for each site calculates the change in staff time proportions falling into each category between the two points in time.

| | Carle Clinic (IL) | | | LAH (MN) | | |
|----------------------|-------------------|--------------|--------|--------------|--------------|--------|
| | month 17 | month 41 | change | month 17 | month 41 | change |
| Home visits | 0.034 | 0.162 | 0.127 | 0.098 | 0.213 | 0.115 |
| Phone & other visits | 0.218 | 0.225 | 0.007 | 0.070 | 0.136 | 0.065 |
| Documentation | 0.292 | 0.206 | -0.086 | 0.068 | 0.104 | 0.036 |
| Baseline | 0.073 | 0.029 | -0.043 | 0.303 | 0.060 | -0.243 |
| Reassessment | 0.319 | 0.250 | -0.070 | 0.324 | 0.307 | -0.017 |
| Meetings | 0.015 | 0.026 | 0.011 | 0.046 | 0.061 | 0.015 |
| Travel | 0.048 | 0.099 | 0.051 | 0.089 | 0.104 | 0.015 |
| Total | 1.000 | 0.998 | | 0.998 | 0.984 | |

As expected, the proportion of staff time devoted to baseline assessments fell at both sites, indicating that enrolled populations became more stable over the period. Perhaps less anticipated, the proportion of time spent administering periodic reassessments also declined.

Most critically, Table 7.1 indicates that although phone contacts as a proportion of total time grew as expected, travel also grew, and home visits grew the most. These results indicate that the composition of staff time did not change as would have been expected, had enrollment in a CNO resulted in more efficient utilization patterns.

7.3 Survey Analysis

7.3.1 Overview

This section analyzes utilization data from the baseline and follow-up surveys of beneficiaries associated with the CNO demonstration. Baseline surveys were administered to CNO applicants by the sites at randomization. Follow-up surveys were administered to both treatment and control groups by Abt Associates up to three times, at approximately 15 months, 18 months, and 29 months after randomization. Both baseline and follow-up surveys asked respondents a series of questions about their utilization of health services in the six-month period prior to the survey. These questions fell into two categories:

- Did the respondent use a particular service in the last six months?
- If so, how many units (including visits, referrals, days, meals, stays, trips, or items) did they use?

The services included in each category were:

- Home nursing care
- Special therapies delivered in the home including physical, occupational, and speech as well as social services
- Special therapies delivered outside the home
- Home health aide and homemaker services
- Referrals to primary care provider
- Adult day health care services
- Respite care
- Case management services
- Home delivered meals
- Information about nutrition
- Transportation services
- Hospital stays
- Hospital stays for heart disease, hip fracture, cancer, or Alzheimer's disease
- Nursing home stays
- Physician or nurse practitioner visits
- Visits with a medical specialist
- Emergency room visits
- Outpatient surgery visits
- Dentist services
- New adaptive equipment
- Legal, financial, or housing counseling

Since this evaluation was designed with random assignment to treatment and control groups, a simple comparison of means between groups reveals average effects of assignment to the treatment group.

7.3.2 Results

The most notable result from the survey questions on utilization was that members of the treatment group reported a higher probability of receiving services, but, among those who received some services, the treatment group reported receiving smaller amounts than their counterparts in the control group. The major exception to this generalization was total nurse contacts, which were consistently higher for the treatment group. These findings are reported in detail in Table 7.2.

Table 7.2: Summary of Significant Results from Analysis of Utilization Survey Questions

| | Overall | Carle | Carondelet | LAH | VNS |
|---|---------|-------|------------|-----|-----|
| <i>Were any services received?</i> | | | | | |
| Nursing care | 3* | 1 | 1 | 3 | 1 |
| Therapy in home | 2 | | | 2 | |
| Therapy out of home | 1 | | 1 | | |
| Homemaker services | 2 | 1 | | | |
| Respite services | 2 | | | 1 | |
| Case management | 3 | 2 | 3 | 2 | |
| Nutrition information | 3 | 2 | 3 | 3 | 1 |
| Physician visits | 2 | | | 1 | 2 |
| Adaptive equipment | 1 | | | | |
| Transportation | | 1 | | | -1 |
| Hospital stay | | -1 | | | |
| Specialist visits | | | | -1 | -1 |
| Emergency room | | | | | -1 |
| Outpatient surgery | | | | | -1 |
| <i>For those receiving services, how many services were received?</i> | | | | | |
| Total nurse contacts | 3 | 2 | 1 | 1 | 3 |
| Home nurse visits | -2 | | | -2 | -2 |
| Homemaker visits | -2 | | | -2 | -1 |
| Respite care visits | -1 | | | | -1 |
| Case management visits | -2 | -1 | | | -1 |
| Nutrition information visits | -2 | | -3 | -1 | |
| Transportation trips | -1 | | | | |
| Nursing home stays | -1 | | | -1 | |
| Dentist visits | | 1 | | | |
| Legal or other counseling | | 1 | | -1 | |
| Therapy in home visits | | | -1 | | |
| Referrals | | | | -1 | |
| Emergency room visits | | | | -1 | |

* 3 indicates mean treatment group response significantly greater than control group at all 3 follow-up waves; 2 and 1 indicate same for 2 and 1 follow-up waves, respectively. -3, -2, and -1 indicate treatment group response significantly less than control group at 3, 2, and 1 follow-up waves, respectively

As indicated by the table, probabilities of receiving nursing care, case management, and nutrition information were widely reported to be higher for the treatment group along with the total number of nurse contacts. For those receiving services, the amounts of home nursing, homemaker, case management, and nutrition information visits were broadly reported to be less for the treatment group. Thus, while there is evidence of a different pattern of care for CNO enrollees, the survey data are ambiguous about whether overall utilization was higher or lower for the treatment group.

7.4 CNO Utilization and Medicare Claims

7.4.1 Overview

This section analyzes beneficiary-level service utilization data collected directly from the sites and culled from Medicare claims records. These data reflect the use of a variety of health services by the treatment and control groups and were used to test expectations regarding both CNO-covered and non-CNO service utilization.

Counts of CNO-covered and non-CNO services are analyzed below. Covered services included visits by home health aides, professional therapists, and skilled nurses. Non-CNO services included emergency room events, physician visits, admissions to Skilled Nursing Facilities (SNFs), and admissions to inpatient hospitals. Each analysis compared utilization by the treatment group to the control group and took four approaches. First, we defined the treatment group to include all those randomized into the treatment group, regardless of whether they actually enrolled in the CNO. Based on this definition, we compared utilization with and without adjusting for risk associated with age and home health utilization prior to randomization. Next, we defined the treatment group to include only those actually enrolled in the CNO, and compared non-adjusted and risk-adjusted utilization based on that definition.

We found no systematic impact of randomization to the treatment group in any of the categories of services examined. This indicates both that the CNO did not reduce utilization of covered services and that it did not shift utilization to providers of non-covered services. When the treatment group was redefined to include only those actually enrolled, we found that utilization of some services by the treatment group was lower, but these results were sensitive to the inclusion of risk-adjusting variables in the analysis. We conclude that the additional results generated by redefining the treatment group were most likely artifacts produced by the disenrollment of high-utilization members of the treatment group. This may have occurred if individuals with high utilization felt constrained by CNO rules and therefore chose to disenroll.

7.4.2 Sample and Methodology

We started with all beneficiaries randomized into either treatment or control groups and collected 25 months of claims data prior to randomization for each of them. Given the random assignment feature of the demonstration design, collection of these pre-randomization claims was not strictly necessary to obtain unbiased results, but it allowed additional checks of the randomization and enhanced the robustness of the conclusions. After randomization, we tabulated data from Medicare claims and CNO records by month up to 36 months following the corresponding randomization date. For any beneficiaries who died, were less than 65 years old, were enrolled in a Medicare HMO, or became ineligible for part A or B, we excluded their affected months from consideration. For beneficiaries

who did not receive a baseline assessment or were randomized after September of 1995, we excluded their entire history.

Throughout the analysis, we employed two different definitions of the treatment and control groups. The first defined the treatment group to consist of all those randomized to the treatment group, regardless of when they were actually enrolled. Similarly, the control group was defined to include all beneficiaries randomized to the control group. The strength of this definition is that it minimized the possibility that average utilization rates might have been biased by high-utilization individuals who chose to disenroll. This selection bias might have made it seem that enrollment reduced utilization, when in fact only low-utilization individuals enrolled. For this reason, this was our preferred sample definition.

The alternative definition limited the treatment group to include only those beneficiary-months when the beneficiary was actually enrolled. This primarily excluded beneficiary-months when the individual had moved out of the CNO area or voluntarily disenrolled. Under this definition, the control group was further limited by excluding those beneficiary-months when the beneficiary was ineligible for the CNO because of End Stage Renal Disease, admission to a hospice, or residence in a Skilled Nursing Facility for longer than 60 days, all according to Medicare records. Table 7.3 summarizes the development of these two samples.

The strength of this second definition is that because enrollees are not mixed with unenrolled beneficiaries in the treatment group, it maximizes the possibility of detecting a treatment effect if one exists. However, if a treatment effect is detected, one cannot determine if it resulted from treatment or from selection bias. Consequently, we emphasize the logistic regression results obtained from this sample, since a simple comparison of means will suffer relatively more from systematic differences between the treatment and control groups.

Comparisons between treatment and control groups were made graphically, through simple comparison of means, and by logistic regression. Since this evaluation featured random assignment to treatment and control groups, potentially confounding factors such as age and prior health history should not differ systematically between treatment and control groups. If this is true, the simple graphs and comparisons of means are sufficient to draw conclusions. Nevertheless, to provide a reliability check on the randomization, we employed logistic regressions to control for differences in age and home health aide visits prior to randomization. Since such factors are known to contribute to the risk of poor health, controlling for them is sometimes referred to as "risk-adjusting" the analysis. In addition, we specified the regressions to control for any differences between treatment and control groups existing prior to randomization, yielding slightly more focused results. Since the conclusions from these regressions did not differ markedly from those drawn from simpler techniques when applied to our preferred sample, we conclude that the randomization was successful.

Table 7.3: Development of Sample for Utilization Analysis: Two Alternative Definitions

| | Carle | | Carondelet | | LAH | | VNS | |
|--|----------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|
| | Treatment | Control | Treatment | Control | Treatment | Control | Treatment | Control |
| Initial person-months | 170,706 | 75,714 | 210,243 | 93,289 | 140,346 | 62,466 | 127,392 | 47,334 |
| Dropped due to lack of baseline survey or other records problems | 11,454 | 6,624 | 7,728 | 2,070 | 5,865 | 2,484 | 19,734 | 6,348 |
| Dropped because randomized after 9/95 | 22,839 | 5,196 | 44,022 | 10,281 | 17,664 | 2,367 | 27,825 | 1,380 |
| Dropped because more than 3 years from randomization | 17,793 | 8,334 | 20,673 | 10,557 | 15,237 | 7,515 | 10,413 | 5,166 |
| Dropped due to death, under 65, Part A or B inelig., HMO status, or after 9/97 | 9,691 | 4,369 | 18,778 | 10,320 | 7,550 | 3,486 | 5,984 | 2,867 |
| Final person-months, first definition | 108,929 | 51,191 | 119,042 | 60,060 | 94,030 | 46,614 | 63,436 | 31,573 |
| Dropped due to disenrollment, or ineligibility | 7,423 | 103 | 10,984 | 167 | 4,465 | 166 | 4,971 | 132 |
| Final person-months, second definition | 101,506 | 51,088 | 108,058 | 59,893 | 89,565 | 46,448 | 58,465 | 31,441 |

Note: all figures in person-months

Specifications for the logistic regressions are given by two equations. Equation (7.1) gives the non-risk-adjusted specification.

$$(7.1) U_{it} = \alpha + \delta_1 Treatment_{it} + \delta_2 Post_{it} + \delta_3 Treat_{it} * Post_{it} + \epsilon_{it}$$

where U denotes a measure of utilization like inpatient hospital admissions or professional therapy visits; $Treatment$, $Post$, and $Treat*Post$ denote indicator variables signifying assignment to the treatment group, that the current month is post-randomization, and that both are true, respectively. α , δ_1 , δ_2 , and δ_3 are parameters to be estimated, and ϵ is a disturbance term. The subscripts i and t index individual beneficiaries and months relative to randomization (from -24 to 36), respectively. For each category of utilization, U was defined to equal one if the beneficiary had any utilization in that particular month, and zero otherwise. The parameter of interest is δ_3 , the coefficient on $Treat*Post$, indicating how utilization by the treatment group differed from the control group and from utilization before randomization.

Equation (7.2) gives the risk-adjusted specification.

$$(7.2) U_{it} = \alpha + \delta_1 Treatment_{it} + \delta_2 Post_{it} + \delta_3 Treat_{it} * Post_{it} + \beta_1 PastHH_{it} + \beta_2 Age_{it} + \epsilon_{it}$$

where PastHH denotes the number of home health aide visits received in the 24 months prior to randomization and age indicates the beneficiary's age in days

When applied to the alternative sample, in contrast to the preferred sample, logistic regressions did not always agree with simpler techniques. This was because disenrollment from the treatment group was not random, in particular, older enrollees or those with higher pre-randomization home health utilization were more likely to disenroll, perhaps because they found the CNO rules constraining. The logistic regressions controlled for these two risk factors, generating estimates that are less subject to selection bias than the simple comparison of means. It is likely, however, that other factors relating to health status and attitudes toward utilization also differed systematically between those who remained and those who disenrolled from the treatment group. Since these other factors were not accounted for in the logistic regressions, we conclude that the potential for further selection bias was severe.

7.4.3 CNO-Covered Utilization

To address the question of whether CNO-covered services were used less heavily by the treatment group, this section analyzes data on visits by home health aides, professional therapists, and skilled nurses. An overall view of the data is provided by Figures 7.4 through 7.12. These figures graph mean cumulative visits for treatment and control groups from 25 months prior to randomization (beneficiary month [benmo] = -24) to 36 months after randomization. Carle, Carondelet, and LAH each have three figures, one for each type of visit. VNS was excluded from this analysis because VNS staff conducted these visits themselves. A quick review of the figures suggests that treatment groups at Carle and Carondelet may have had lower home health aide visits and higher therapy visits, although the statistical significance of these patterns cannot be determined from the figures.

To measure statistical significance, mean cumulative utilization was calculated at four points in time relative to randomization: 1 month prior, and 12, 24, and 36 months after. These means are reported in Table 7.4, and differences between treatment and control group means that are significant at the 5% level are marked with an asterisk.

The first column, that reports means for 1 month prior to randomization, provides a baseline comparison that we expected to show little difference between treatment and control groups. This expectation was affirmed by the data. The table reveals that most of the differences notable in the figures fail to be statistically significant. The only exception was that at 36 months after randomization the Carondelet treatment group had significantly lower mean cumulative home health aide visits. These results do not support the hypothesis that enrollment in the CNO reduced utilization of CNO-covered services.

Figure 7.4

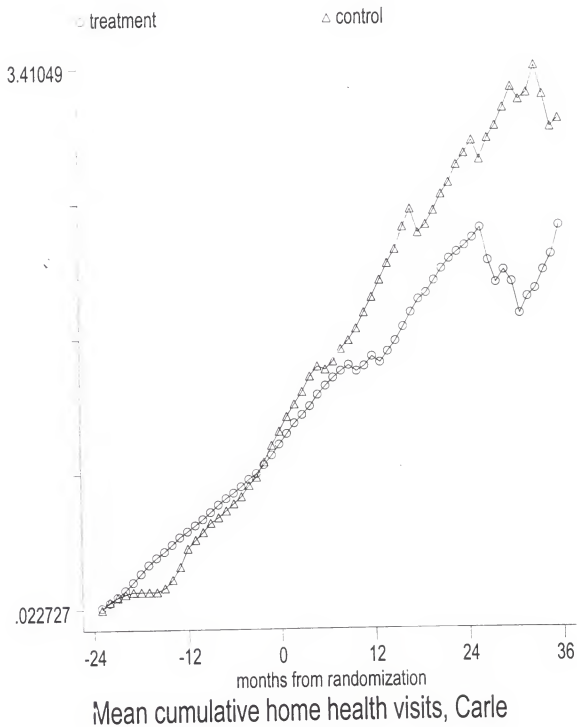


Figure 7.5

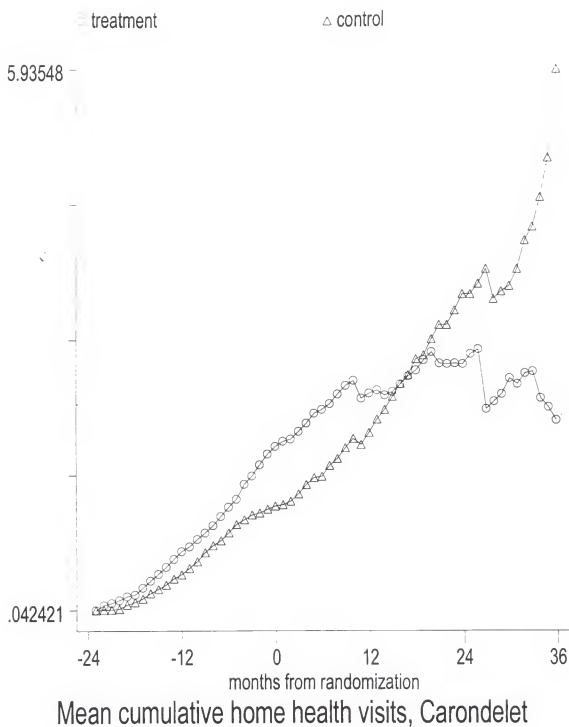


Figure 7.6

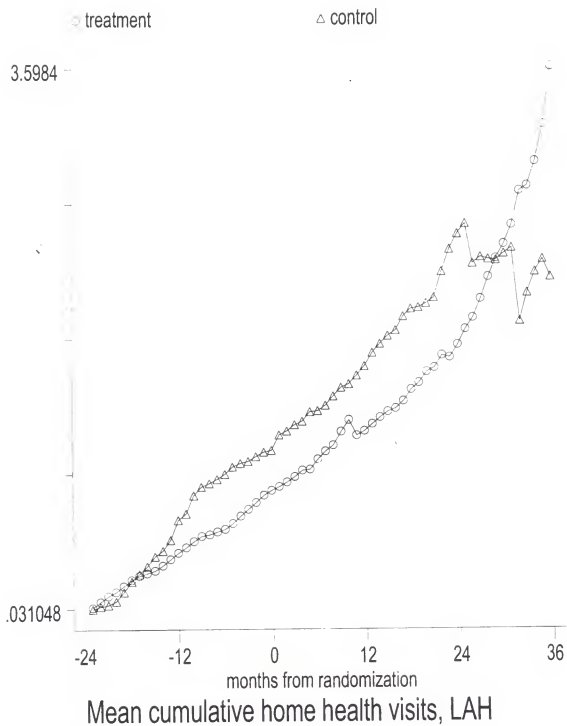


Figure 7.7

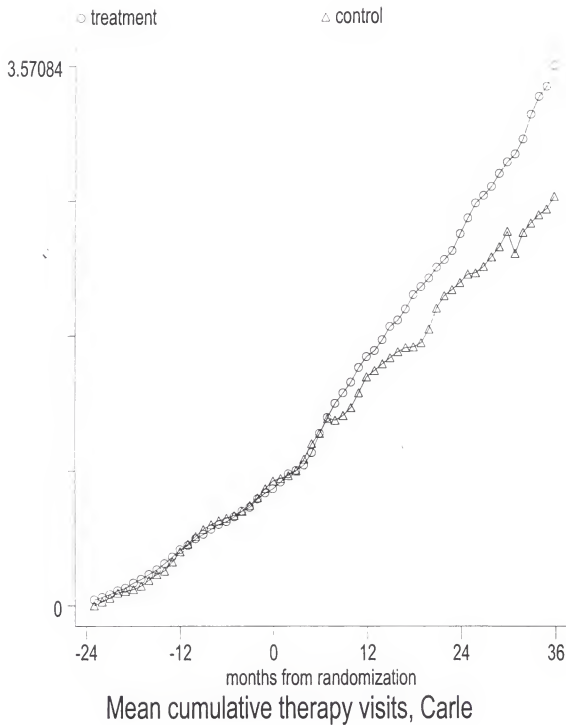


Figure 7.8

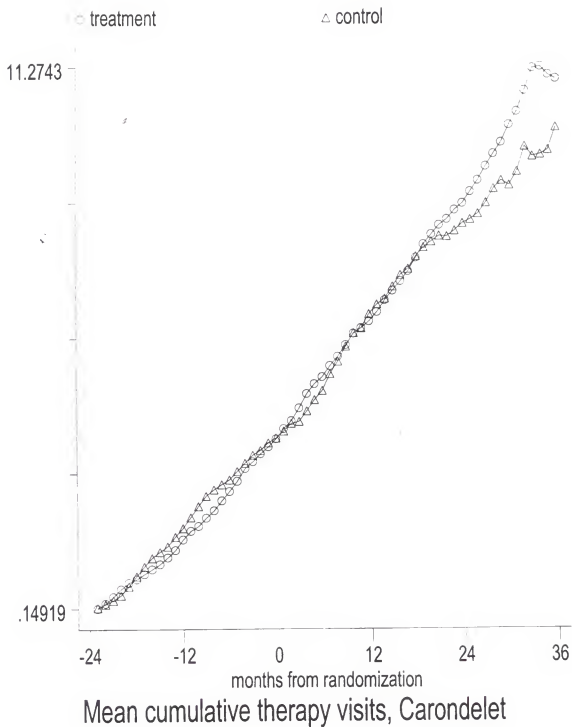


Figure 7.9

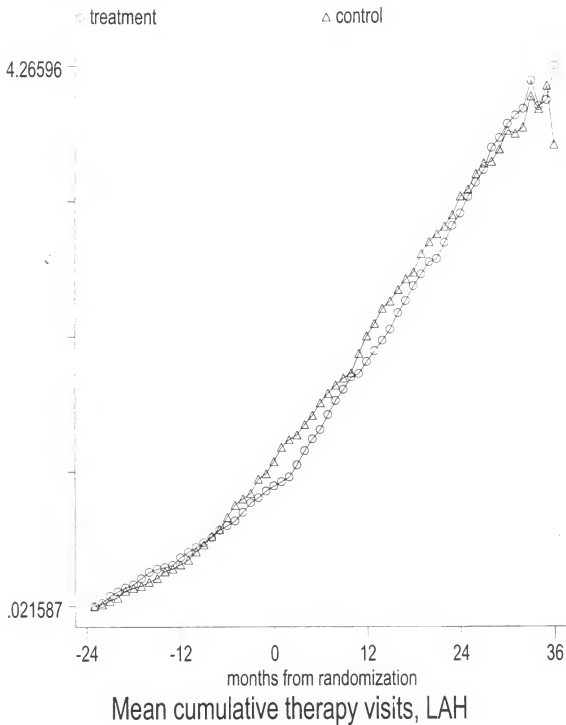


Figure 7.10

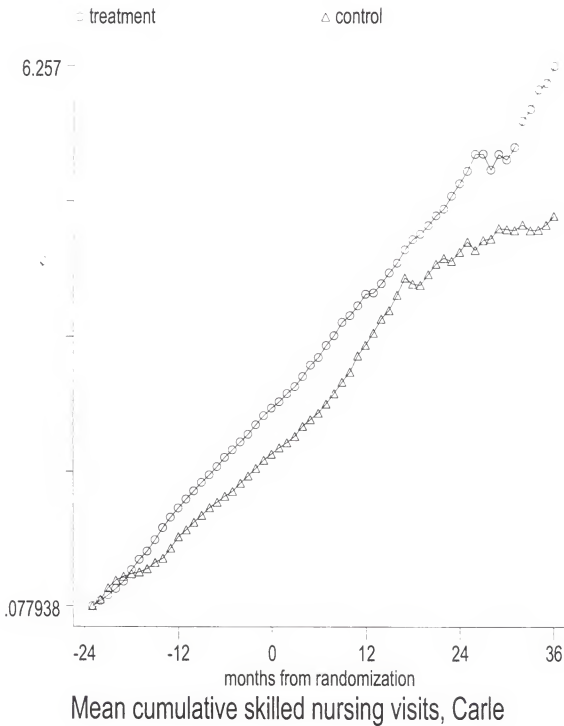


Figure 7.11

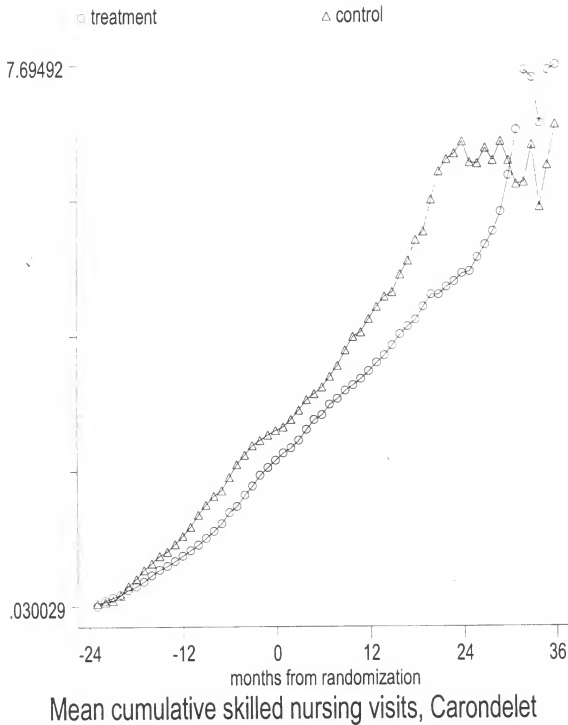


Figure 7.12

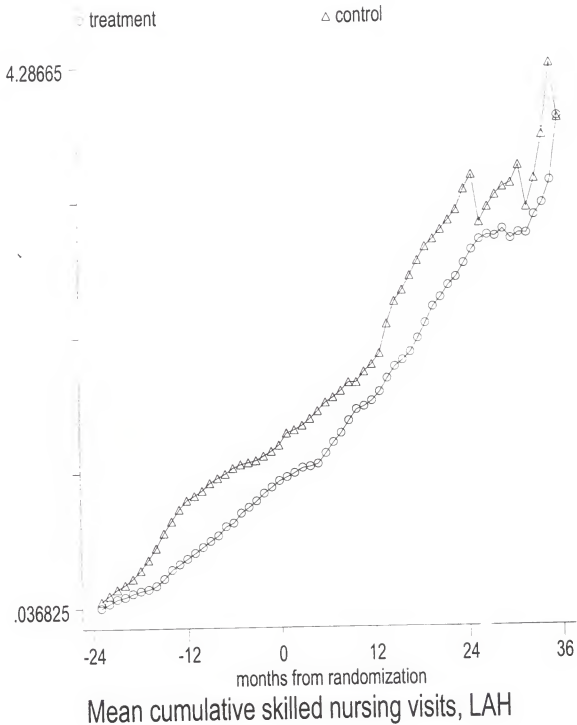


Table 7.4: Mean Cumulative Utilization of CNO-covered Services at Four Points in Time Relative to Randomization

| Treatment = Randomized to Treatment Group | | | | | | | | |
|---|---------------|---------|----------------|---------|----------------|---------|----------------|---------|
| | 1 month prior | | 12 months post | | 24 months post | | 36 months post | |
| | Treatment | Control | Treatment | Control | Treatment | Control | Treatment | Control |
| Home health aide visits | | | | | | | | |
| Carle | 0.99 | 1.05 | 1.60 | 1.97 | 2.28 | 2.86 | 2.41 | 3.08 |
| Carondelet | 1.74 | 1.14 | 2.41 | 1.98 | 2.73 | 3.49 | 2.12* | 5.94 |
| LAH | 0.77 | 1.06 | 1.20 | 1.63 | 1.77 | 2.50 | 3.59 | 2.22 |
| Therapy visits | | | | | | | | |
| Carle | 0.75 | 0.78 | 1.65 | 1.52 | 2.46 | 2.14 | 3.57 | 2.71 |
| Carondelet | 3.47 | 3.56 | 6.05 | 6.20 | 8.47 | 8.06 | 11.03 | 10.03 |
| LAH | 0.92 | 1.06 | 0.95 | 2.15 | 3.12 | 3.25 | 4.27 | 3.65 |
| Skilled nursing visits | | | | | | | | |
| Carle | 2.26 | 1.75 | 3.65 | 3.08 | 4.92 | 4.14 | 6.26 | 4.55 |
| Carondelet | 2.00 | 2.46 | 3.37 | 4.11 | 4.76 | 6.61 | 7.69 | 6.86 |
| LAH | 0.98 | 1.26 | 1.65 | 1.94 | 2.73 | 3.31 | 3.87 | 3.86 |

* Indicates significant treatment effect at 95% confidence

By contrast, when alternative definitions were imposed on the treatment and control groups to focus attention on those actually eligible and enrolled, seven significant treatment effects were detected, indicating that both skilled nursing and home health aide visits were lower among the enrolled treatment groups at Carondelet and LAH. These results are reported in Table 7.5. Since, as indicated by Table 7.3, the control group was not substantially changed by the new definitions, most changes between the two tables were due to the removal of numerous high-utilization beneficiary-months from the treatment group. Since many of these individuals disenrolled voluntarily, the evidence is consistent with the hypothesis that high-utilization individuals found CNO rules to be constraining and chose to disenroll, reducing observed mean utilization for the treatment group.

Table 7.5: Mean Cumulative Utilization of CNO-covered Services at Four Points in Time Relative to Randomization

| Treatment = Randomized to Treatment Group and Enrolled in CNO | | | | | | | | |
|---|---------------|---------|----------------|---------|----------------|---------|----------------|---------|
| | 1 month prior | | 12 months post | | 24 months post | | 36 months post | |
| | Treatment | Control | Treatment | Control | Treatment | Control | Treatment | Control |
| Home health aide visits | | | | | | | | |
| Carle | 0.99 | 1.05 | 1.32 | 1.97 | 1.35 | 2.85 | 1.33 | 3.05 |
| Carondelet | 1.74 | 1.14 | 1.29 | 1.99 | 0.88* | 3.44 | 0.74* | 5.65 |
| LAH | 0.77 | 1.06 | 0.87 | 1.63 | 1.16* | 2.02 | 1.54 | 2.21 |
| Therapy visits | | | | | | | | |
| Carle | 0.75 | 0.78 | 1.59 | 1.49 | 2.28 | 2.14 | 3.32 | 2.66 |
| Carondelet | 3.47 | 3.56 | 5.88 | 6.22 | 7.83 | 7.96 | 10.30 | 9.86 |
| LAH | 0.92 | 1.06 | 1.83 | 2.20 | 2.92 | 3.27 | 3.73 | 3.64 |
| Skilled nursing visits | | | | | | | | |
| Carle | 2.26 | 1.75 | 3.46 | 2.95 | 4.08 | 3.89 | 5.06 | 4.43 |
| Carondelet | 2.00 | 2.46 | 2.06* | 4.11 | 2.36* | 6.54 | 2.37* | 6.78 |
| LAH | 0.98 | 1.26 | 1.30 | 1.94 | 1.90* | 3.10 | 1.98 | 3.86 |

* Indicates significant treatment effect at 95% confidence

As a check on randomization and to control for pre-randomization differences in utilization between treatment and control groups, we performed logistic regressions for each utilization category at each site. For the preferred sample, Table 7.6 contains a pair of columns for each site: non-risk-adjusted results are reported in the first column and risk-adjusted results are contained in the second.

Results are reported as odds ratios, defined to be a ratio of ratios. The ratio in the numerator is the estimated probability of having utilization over the estimated probability of not having utilization, conditional on a higher value of the independent variable. The ratio in the denominator is the same, conditional on a lower value of the independent variable. Hence, the odds ratio provides a proportionate measure of how much the relative probability of utilization increases when the independent variable grows by one unit.

Table 7.6: Logistic Regression Results: The Effect of Treatment on the Probability of Utilization of CNO-covered Services (odds ratios)
Treatment = Randomized to Treatment Group

| | Carle | | Carondelet | | LAH | |
|--------------------------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|
| | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted |
| Home health aide visits | | | | | | |
| Treatment | 0.99 | 0.82 | 1.32 | 1.13 | 0.97 | 1.09 |
| Post | 1.81* | 1.74* | 2.14* | 1.91* | 1.91* | 1.85* |
| Treat*Post | 0.67 | 0.70 | 0.37* | 0.38* | 1.05 | 1.00 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.04* | --- | 1.03* | --- | 1.03* |
| Therapy visits | | | | | | |
| Treatment | 0.93 | 0.91 | 0.93 | 0.91 | 1.00 | 0.99 |
| Post | 1.86* | 1.75* | 1.40* | 1.33* | 1.93* | 1.81* |
| Treat*Post | 1.06 | 1.07 | 1.34* | 1.36* | 1.18 | 1.19 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Skilled nursing visits | | | | | | |
| Treatment | 1.09 | 1.06 | 0.98 | 0.88 | 0.77 | 0.79 |
| Post | 1.53* | 1.35 | 1.77* | 1.61* | 1.68* | 1.52* |
| Treat*Post | 1.24 | 1.30 | 0.97 | 1.03 | 1.32 | 1.31 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.03* | --- | 1.03* | --- | 1.02* |

* Indicates significant treatment effect at 95% confidence

In the case of Post, for example, one unit was the difference between before and after randomization, so one would expect a substantial effect due simply to the aging process. By contrast, since the variable age was measured in days, one would expect an increase of one unit to have had a very small effect. This effect was nevertheless significant because its variance was low; in other words, similar age effects were observable for all beneficiary months.

This was not the case with the variable of interest, Treat*Post. While the estimated odds ratios differed from one by seemingly substantial amounts, these estimates were imprecise because of large variance in effects across person-months. As a consequence, only Carondelet exhibited significant effects of treatment, with more therapy and less home health utilization by the treatment group. These results are comparable to those obtained by the simple comparison of means in Table 7.4.

Furthermore, the addition of risk-adjustment variables to the specification had very little impact on the estimates, indicating that randomization effectively controlled for these risk factors

This was no longer the case under the alternative sample definition. As shown in Table 7.7, the number of significant treatment effects detected by the non-risk-adjusted specification increased from two under the preferred definition to four under the alternative. However, when the risk-adjusted specification is employed, significant treatment effects are once again limited to the original two. These results support the conclusion that enrollment in the CNO did not have systematic effects on utilization of CNO-covered services, and that the observed lower mean utilization rates of CNO enrollees relative to control groups was the result of nonrandom selection.

Table 7.7: Logistic Regression Results: The Effect of Treatment on the Probability of Utilization of CNO-covered Services (odds ratios)
Treatment = Randomized to Treatment Group and Enrolled in CNO

| | Carle | | Carondelet | | LAH | |
|--------------------------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|
| | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted |
| Home health aide visits | | | | | | |
| Treatment | 0.99 | 0.83 | 1.32 | 1.12 | 0.97 | 1.06 |
| Post | 1.79* | 1.80* | 2.08* | 1.89* | 1.85* | 1.75* |
| Treat*Post | 0.51* | 0.49 | 0.13* | 0.12* | 0.86 | 0.87 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.04* | --- | 1.03* | --- | 1.02* |
| Therapy visits | | | | | | |
| Treatment | 0.93 | 0.91 | 0.93 | 0.91 | 1.00 | 1.00 |
| Post | 1.85* | 1.75* | 1.39* | 1.33* | 1.87* | 1.76* |
| Treat*Post | 1.02 | 1.04 | 1.34* | 1.37* | 1.09 | 1.10 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Skilled nursing visits | | | | | | |
| Treatment | 1.10 | 1.07 | 0.98 | 0.87 | 0.77 | 0.79 |
| Post | 1.51* | 1.35 | 1.73* | 1.61* | 1.61* | 1.44 |
| Treat*Post | 1.25 | 1.34 | 0.69* | 0.77 | 1.06 | 1.10 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.04* | --- | 1.03* | --- | 1.02* |

* Indicates significant treatment effect at 95% confidence

7.4.4 Non-CNO Utilization

To address the question of whether non-CNO services were used more heavily by the treatment group, this section analyzes data on physician visits, emergency room events, SNF admissions, inpatient hospital admissions, and preventable hospitalizations.¹ The approach is exactly parallel to the previous section. An overall view of the data is provided by Figures 7.13 through 7.32. These figures graph mean cumulative events for treatment and control groups from 25 months prior to randomization to 36 months after, and each site has four figures, one for each type of event. A quick review of the figures suggests that there was no difference between treatment and control groups with respect to physician visits or inpatient hospitalizations. SNF admissions, preventable hospitalizations and emergency room events are harder to analyze from the figures, although no systematic pattern is discernable across sites.

1 Preventable hospitalizations were defined to be hospitalizations with DRG codes corresponding to the ICD-9-CM codes listed in Culler, Parchman, and Przybylski, "Factors Related to Potentially Preventable Hospitalizations Among the Elderly," *Medical Care*, 36, 6 (1998), p. 807.

Figure 7.13

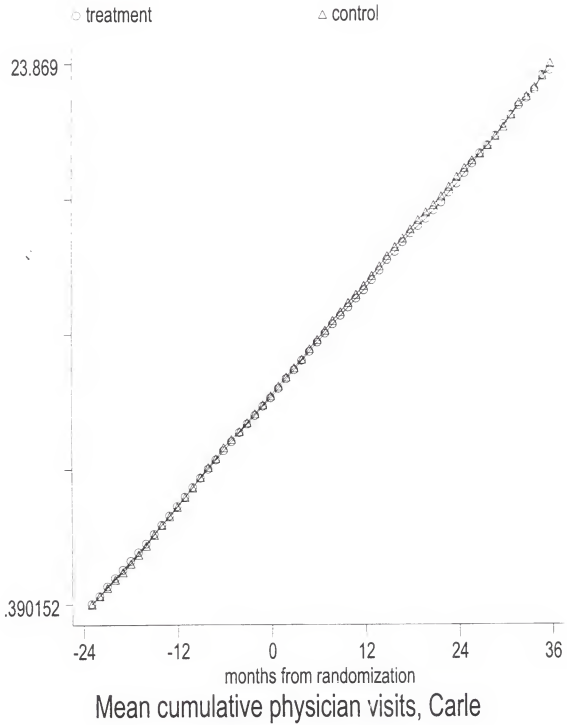


Figure 7.14

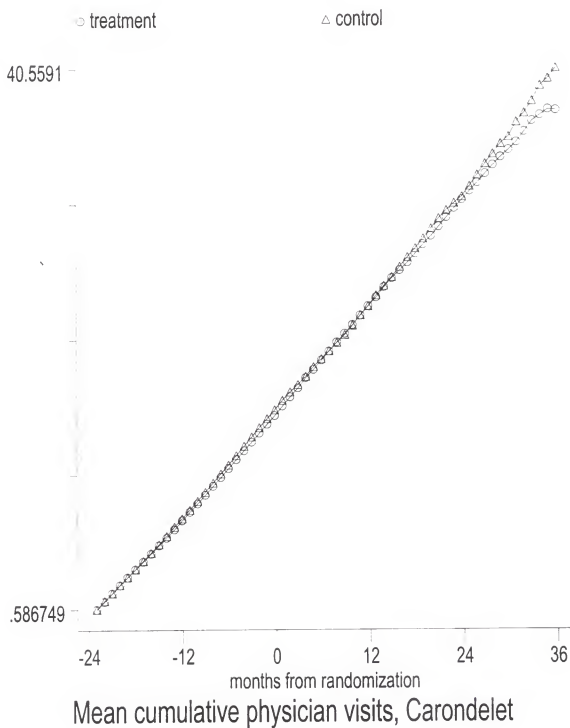


Figure 7.15

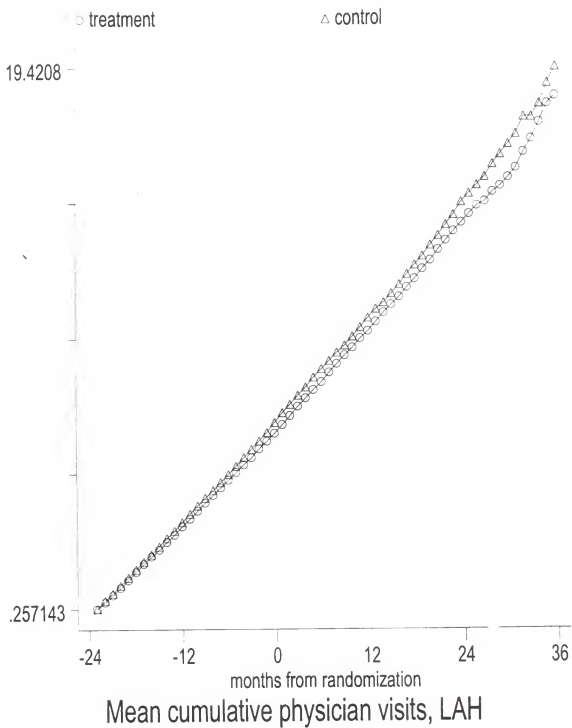


Figure 7.16

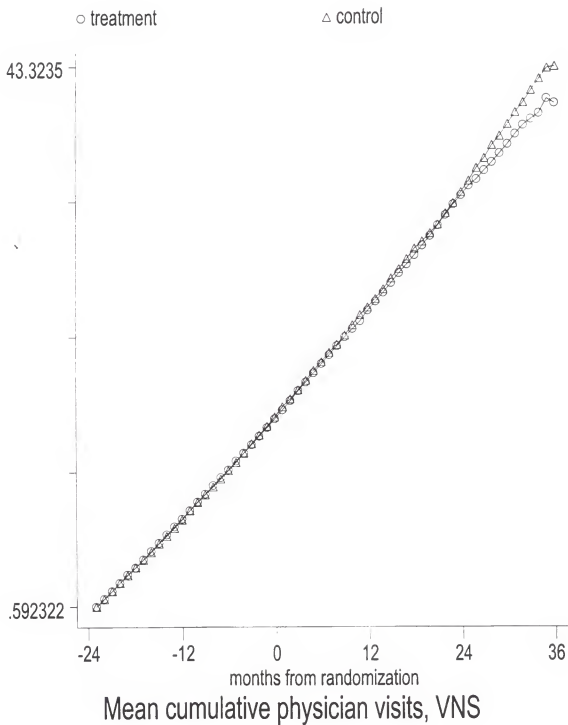


Figure 7.17

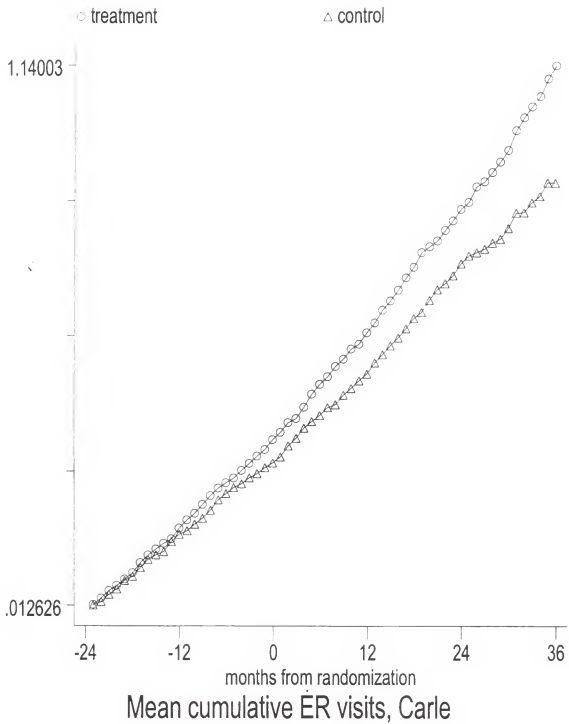


Figure 7.18

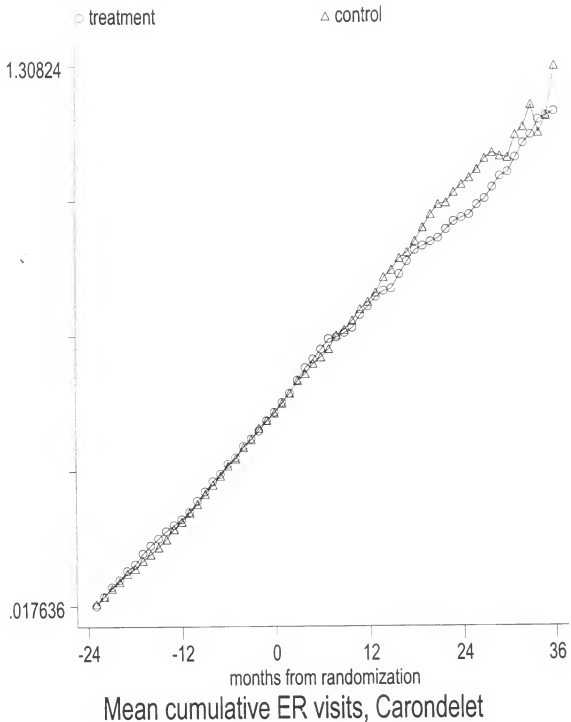


Figure 7.19

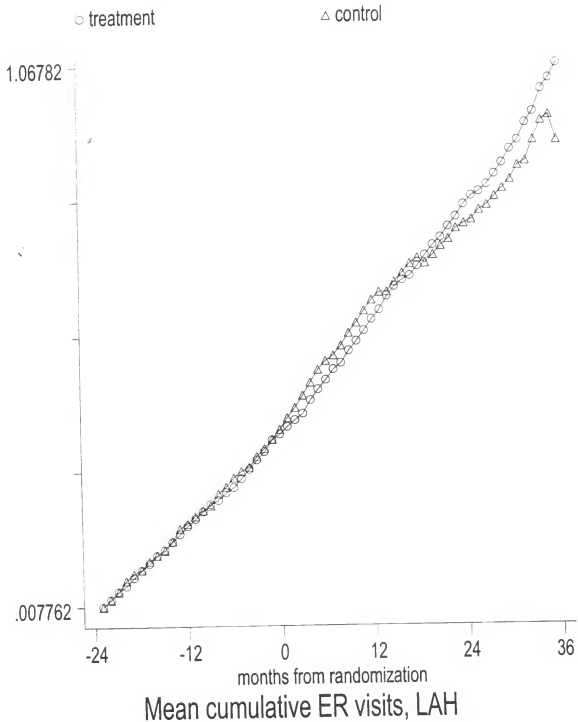


Figure 7.20

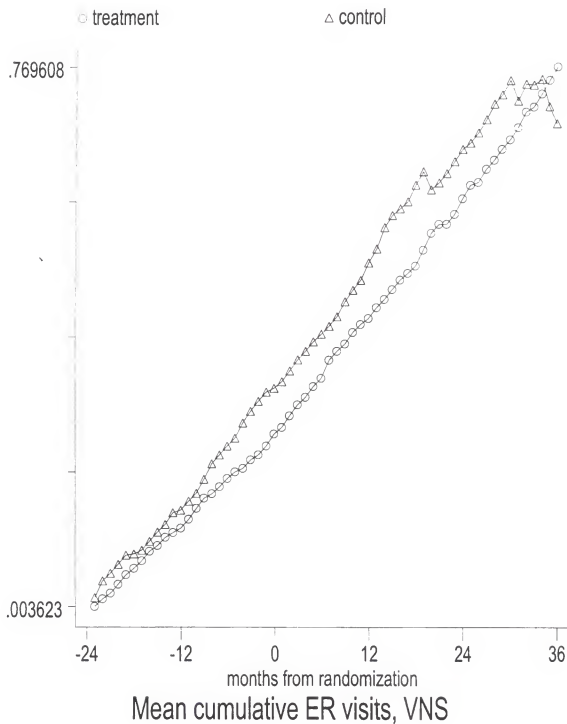


Figure 7.21

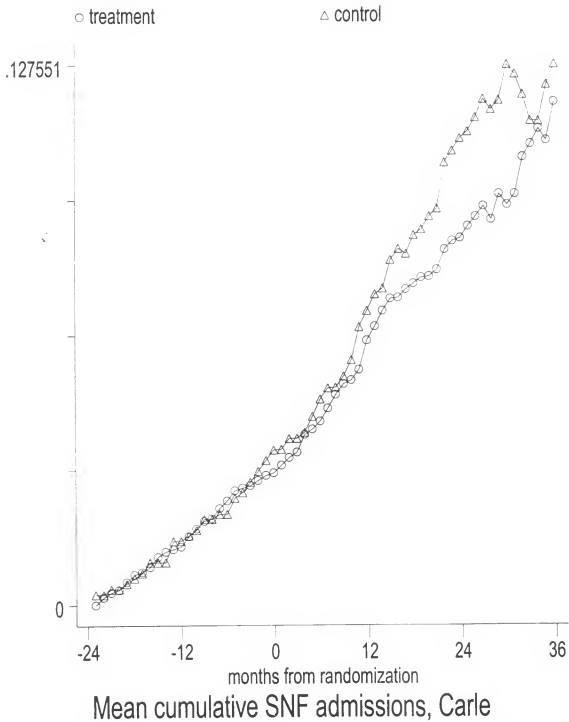


Figure 7.22

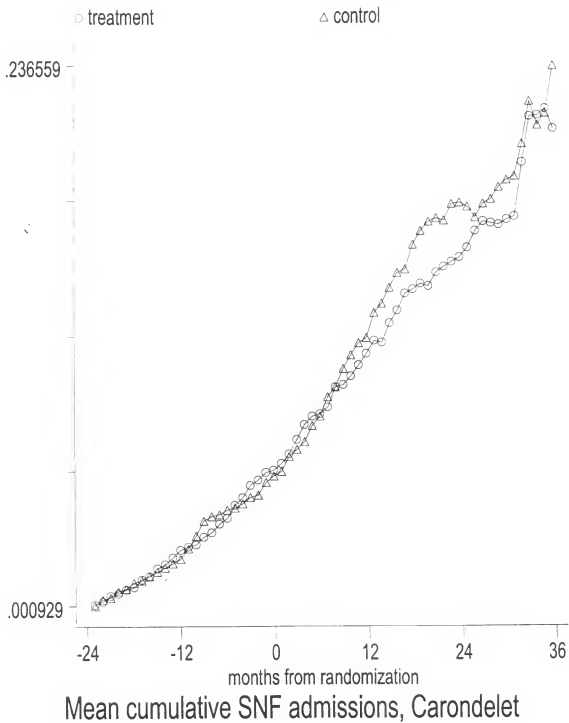


Figure 7.23

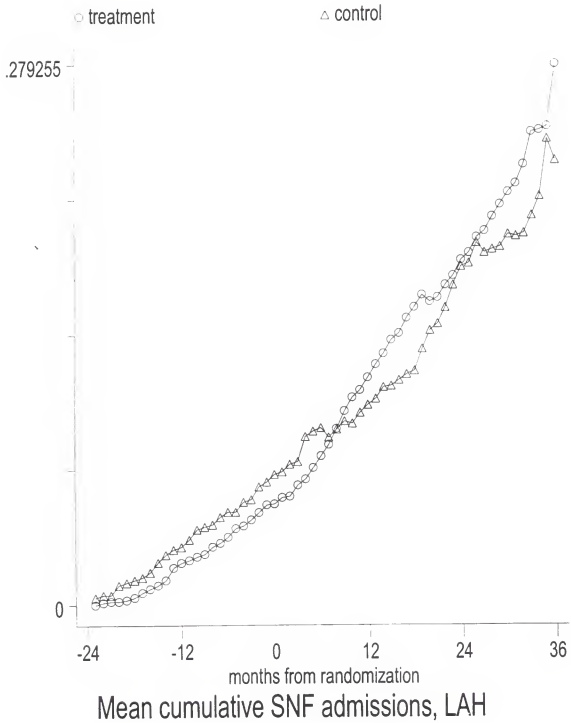


Figure 7.24

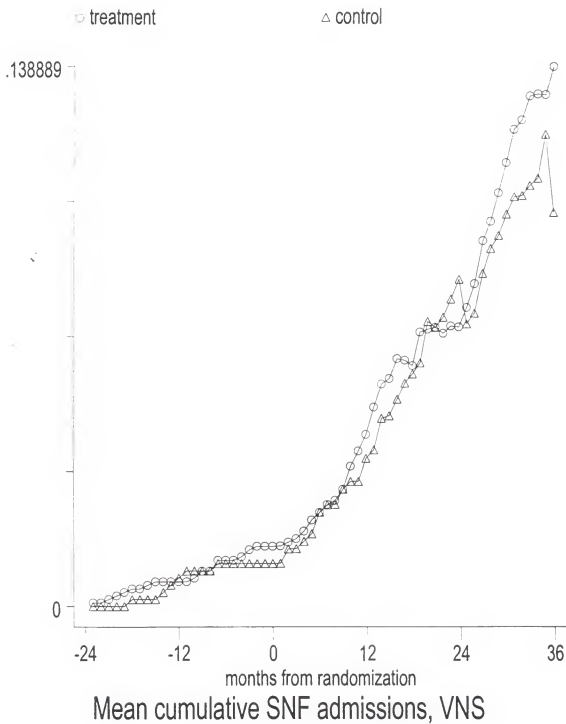


Figure 7.25

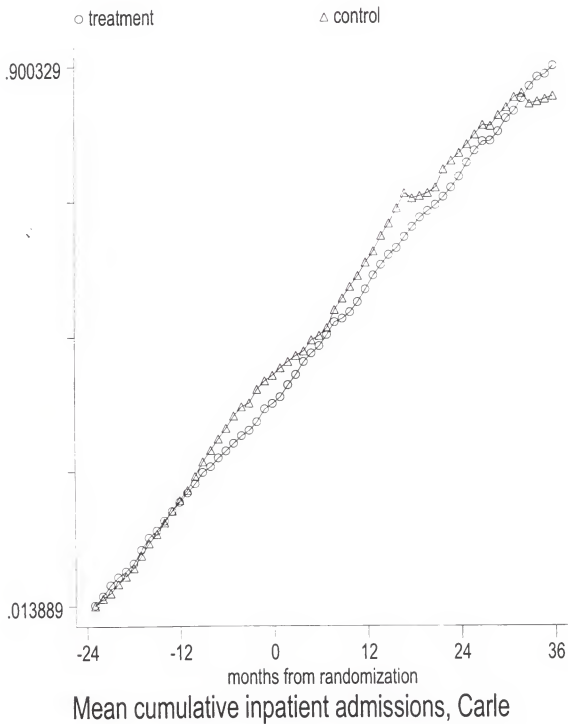


Figure 7.26

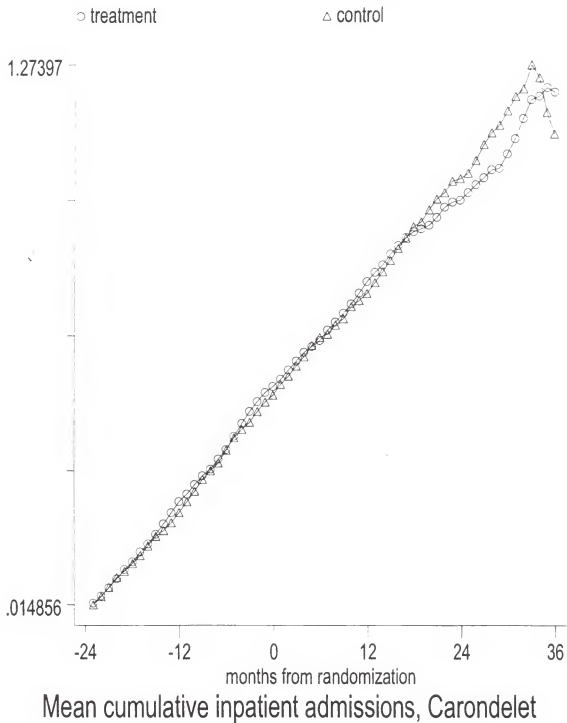


Figure 7.27

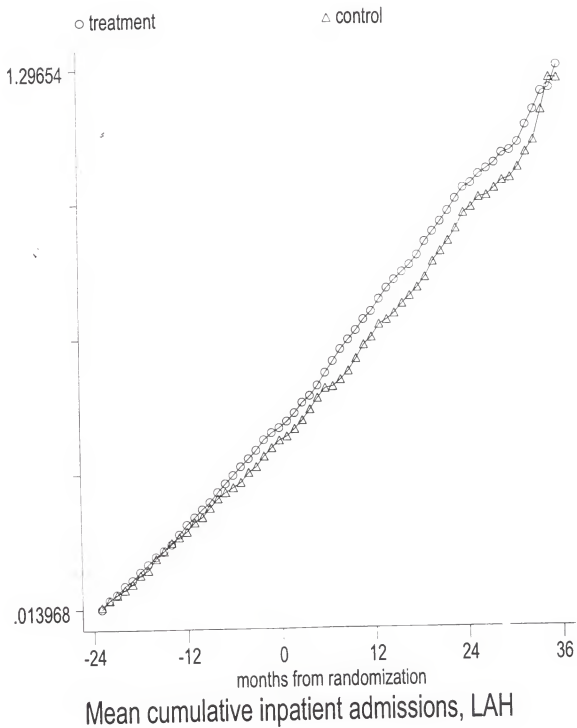


Figure 7.28

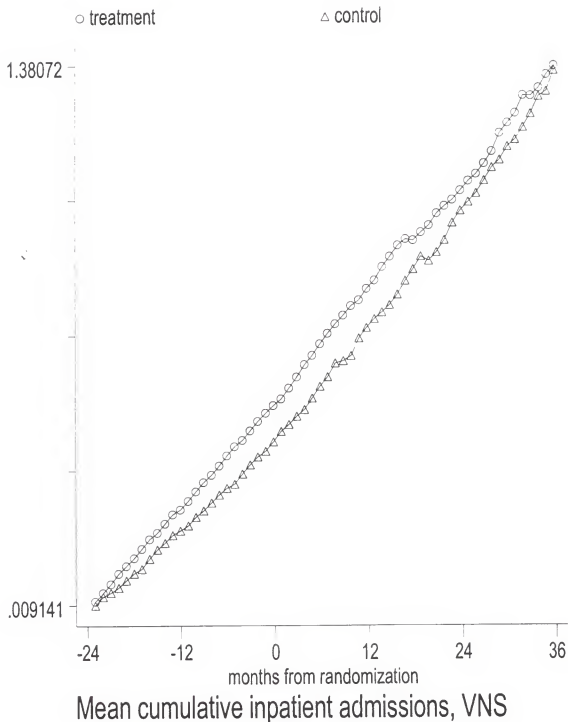


Figure 7.29

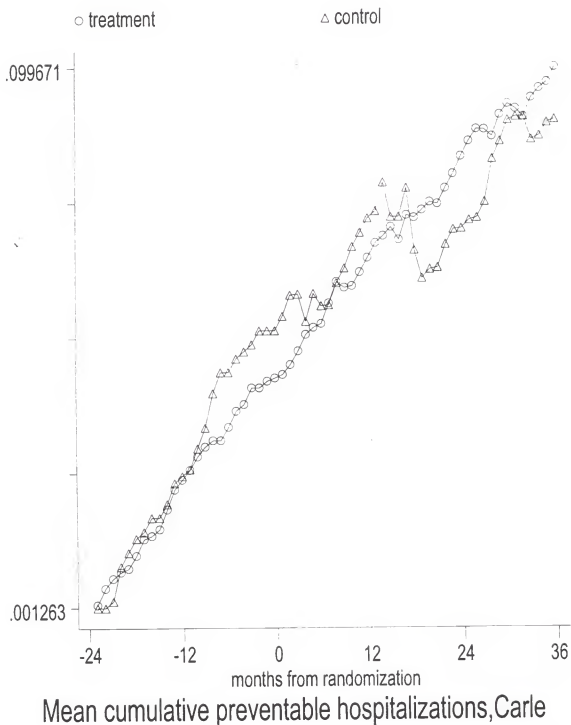


Figure 7.30

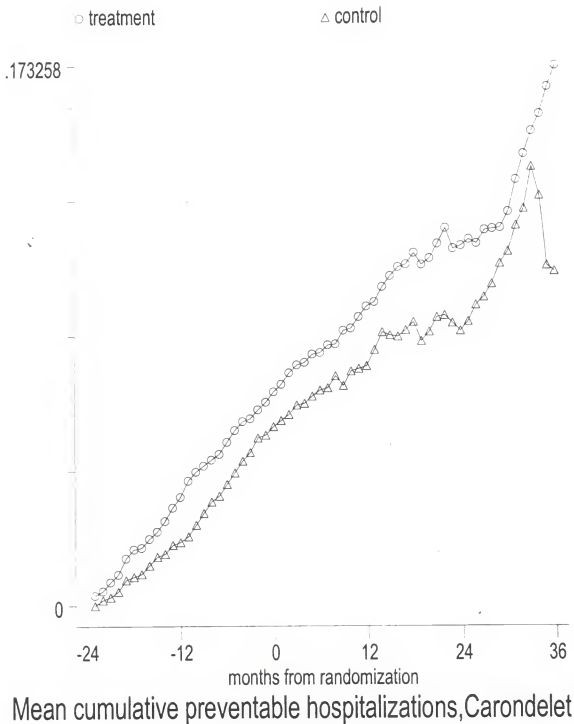


Figure 7.31

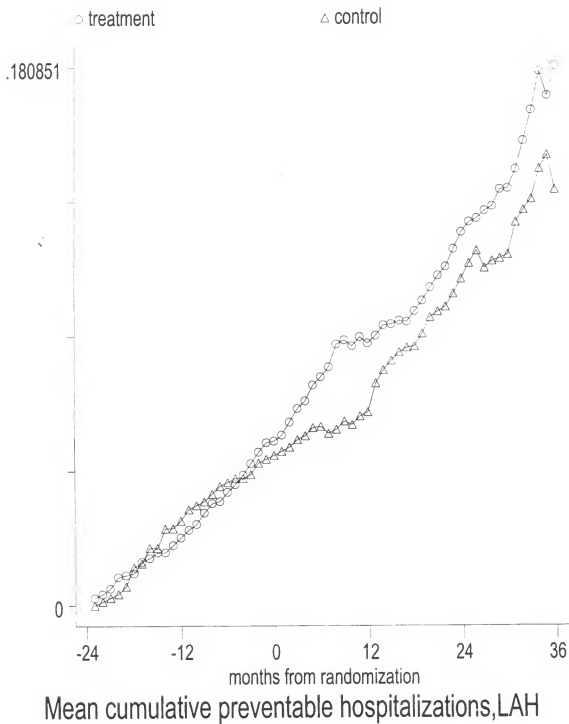
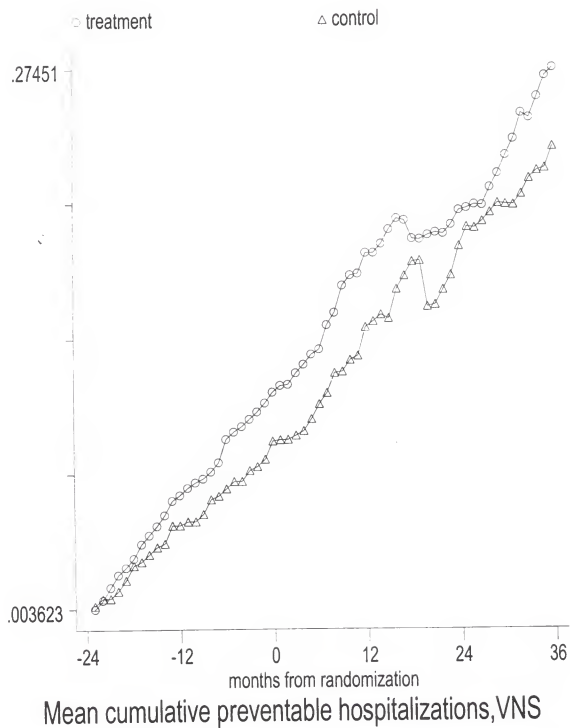


Figure 7.32



To more precisely calculate differences and measure statistical significance, mean cumulative utilization was calculated at four points in time relative to randomization—1 month prior, and 12, 24, and 36 months after. These means are reported in Table 7.8, and differences between treatment and control group means that are significant at the 5% level are marked with an asterisk.

Table 7.8: Mean Cumulative Utilization of Non-CNO Services at Four Points in Time Relative to Randomization

| | Treatment = Randomized to Treatment Group | | | | | | | |
|--|---|---------|----------------|---------|----------------|---------|----------------|---------|
| | 1 month prior | | 12 months post | | 24 months post | | 36 months post | |
| | Treatment | Control | Treatment | Control | Treatment | Control | Treatment | Control |
| Physician visits | | | | | | | | |
| Carle | 8.99 | 9.06 | 14.04 | 14.25 | 18.65 | 18.95 | 23.57 | 23.87 |
| Carondelet | 14.29 | 14.72 | 23.00 | 23.01 | 30.84 | 31.07 | 37.43 | 40.56 |
| LAH | 6.20 | 6.52 | 10.12 | 10.58 | 13.93 | 14.66 | 18.40 | 19.42 |
| VNS | 14.78 | 14.90 | 24.08 | 24.32 | 33.14 | 33.40 | 40.44 | 43.32 |
| Emergency room events | | | | | | | | |
| Carle | 0.33 | 0.30 | 0.59 | 0.50 | 0.84 | 0.73 | 1.14* | 0.90 |
| Carondelet | 0.46 | 0.46 | 0.74 | 0.75 | 0.94 | 1.02 | 1.20 | 1.31 |
| LAH | 0.33 | 0.33 | 0.57 | 0.61 | 0.79 | 0.76 | 1.07 | 0.92 |
| VNS | 0.23* | 0.31 | 0.41 | 0.49 | 0.58 | 0.65 | 0.61 | 0.69 |
| Skilled Nursing Facility admissions | | | | | | | | |
| Carle | 0.03 | 0.03 | 0.06 | 0.07 | 0.09 | 0.11 | 0.12 | 0.13 |
| Carondelet | 0.05 | 0.05 | 0.11 | 0.12 | 0.15 | 0.18 | 0.21 | 0.24 |
| LAH | 0.05 | 0.06 | 0.12 | 0.10 | 0.18 | 0.17 | 0.28 | 0.23 |
| VNS | 0.01 | 0.01 | 0.04 | 0.04 | 0.07 | 0.08 | 0.13 | 0.10 |
| Inpatient hospital admissions | | | | | | | | |
| Carle | 0.34 | 0.39 | 0.53 | 0.58 | 0.72 | 0.76 | 0.80 | 0.85 |
| Carondelet | 0.51 | 0.49 | 0.77 | 0.74 | 0.96 | 1.01 | 1.21 | 1.11 |
| LAH | 0.43 | 0.39 | 0.72 | 0.60 | 1.01 | 0.95 | 1.30 | 1.27 |
| VNS | 0.50 | 0.40 | 0.82 | 0.72 | 1.06 | 1.01 | 1.38 | 1.37 |
| Preventable hospitalizations | | | | | | | | |
| Carle | 0.04 | 0.05 | 0.07 | 0.07 | 0.08 | 0.07 | 0.10 | 0.09 |
| Carondelet | 0.06 | 0.05 | 0.10 | 0.08 | 0.12 | 0.09 | 0.17 | 0.11 |
| LAH | 0.05 | 0.05 | 0.09 | 0.06 | 0.12 | 0.11 | 0.18 | 0.14 |
| VNS | 0.11 | 0.08 | 0.18 | 0.15 | 0.20 | 0.18 | 0.28 | 0.24 |

* Indicates significant treatment effect at 95% confidence.

The first column, that reports means for 1 month prior to randomization, provides a baseline comparison that we expected to show little difference between treatment and control groups. With the exception of emergency room events for VNS enrollees, this expectation was confirmed by the data. As in the previous section, this table reveals that most differences notable in the figures fail to be statistically significant. The only exception was that at 36 months after randomization the Carle treatment group had significantly higher mean cumulative emergency room events. These results do not support the hypothesis that enrollment in the CNO increased utilization of non-CNO services.

By contrast, when alternative definitions were imposed on the treatment and control groups to focus attention on those actually eligible and enrolled, four significant treatment effects were detected, indicating that both skilled nursing facility admissions were lower among the enrolled treatment groups at Carle and Carondelet. These results are reported in Table 7.9. Since, as indicated by Table 7.3, the control group was not substantially changed by the new definitions, most changes between the two tables were due to the removal of numerous high-utilization beneficiary-months from the treatment group. Since many of these individuals disenrolled voluntarily, the evidence is consistent with the hypothesis that high-utilization individuals found CNO rules to be constraining and chose to disenroll, reducing observed mean utilization for the treatment group.

As a check on randomization and to control for pre-randomization differences in utilization between treatment and control groups, we performed logistic regressions for each utilization category at each site. For the preferred sample, Table 7.10 contains a pair of columns for each site: non-risk-adjusted results are reported in the first column and risk-adjusted results are contained in the second.

As in the previous section, results are reported as odds ratios, defined to be a ratio of ratios. The ratio in the numerator is the estimated probability of having utilization over the estimated probability of not having utilization, conditional on a higher value of the independent variable. The ratio in the denominator is the same, conditional on a lower value of the independent variable. Hence, the odds ratio provides a proportionate measure of how much the relative probability of utilization increases when the independent variable grows by one unit.

In the case of Post, for example, one unit was the difference between before and after randomization, so one would expect a substantial effect due simply to the aging process. By contrast, since the variable age was measured in days, one would expect an increase of one unit to have had a very small effect. This effect was nevertheless significant because its variance was low; in other words, similar age effects were observable for all beneficiary months.

This was not the case with the variable of interest, Treat*Post. While the estimated odds ratios sometimes differed from one by seemingly substantial amounts, these estimates were imprecise because of large variance in effects across person-months. As a consequence, none of the sites exhibited significant effects of treatment. These results are comparable to those obtained by the simple comparison of means in Table 7.8. Furthermore, the addition of risk-adjustment variables to the specification had very little impact on the estimates, indicating that randomization effectively controlled for these risk factors.

This was no longer the case under the alternative sample definition. As shown in Table 7.11, the enrolled VNS treatment group had significantly lower inpatient hospitalization than the control group, and this result was consistent regardless of risk-adjustment. Given the potential for selection bias in

Table 7.9: Mean Cumulative Utilization of Non-CNO Services at Four Points in Time Relative to Randomization

| Treatment = Randomized to Treatment Group and Enrolled in CNO | | | | | | | | |
|---|---------------|---------|----------------|---------|----------------|---------|----------------|---------|
| | 1 month prior | | 12 months post | | 24 months post | | 36 months post | |
| | Treatment | Control | Treatment | Control | Treatment | Control | Treatment | Control |
| Physician visits | | | | | | | | |
| Carle | 8.99 | 9.06 | 13.83 | 14.22 | 18.37 | 18.90 | 23.08 | 23.74 |
| Carondelet | 14.29 | 14.72 | 22.71 | 22.92 | 29.89 | 31.00 | 37.85 | 40.54 |
| LAH | 6.20 | 6.52 | 9.98 | 10.49 | 13.61 | 14.53 | 17.07 | 19.19 |
| VNS | 14.78 | 14.90 | 23.93 | 24.34 | 32.66 | 33.66 | 40.40 | 43.39 |
| Emergency room events | | | | | | | | |
| Carle | 0.33 | 0.30 | 0.54 | 0.49 | 0.80 | 0.73 | 1.09* | 0.90 |
| Carondelet | 0.46 | 0.46 | 0.69 | 0.74 | 0.98 | 1.02 | 1.10 | 1.30 |
| LAH | 0.33 | 0.33 | 0.56 | 0.60 | 0.76 | 0.71 | 0.98 | 0.88 |
| VNS | 0.23* | 0.31 | 0.38 | 0.49 | 0.52 | 0.65 | 0.77 | 0.70 |
| Skilled Nursing Facility admissions | | | | | | | | |
| Carle | 0.03 | 0.03 | 0.06 | 0.06 | 0.07* | 0.10 | 0.09 | 0.12 |
| Carondelet | 0.05 | 0.05 | 0.10 | 0.11 | 0.11* | 0.17 | 0.12* | 0.21 |
| LAH | 0.05 | 0.06 | 0.09 | 0.10 | 0.13 | 0.16 | 0.18 | 0.21 |
| VNS | 0.01 | 0.01 | 0.02 | 0.03 | 0.03 | 0.05 | 0.07 | 0.09 |
| Inpatient hospital admissions | | | | | | | | |
| Carle | 0.34 | 0.39 | 0.51 | 0.57 | 0.65 | 0.74 | 0.84 | 0.84 |
| Carondelet | 0.51 | 0.49 | 0.72 | 0.73 | 0.88 | 0.99 | 1.07 | 1.07 |
| LAH | 0.43 | 0.39 | 0.67 | 0.65 | 0.91 | 0.89 | 1.09 | 1.20 |
| VNS | 0.50 | 0.40 | 0.77 | 0.70 | 0.98 | 0.99 | 1.27 | 1.37 |
| Preventable hospitalizations | | | | | | | | |
| Carle | 0.04 | 0.05 | 0.06 | 0.07 | 0.07 | 0.07 | 0.09 | 0.09 |
| Carondelet | 0.06 | 0.05 | 0.09 | 0.08 | 0.10 | 0.08 | 0.15 | 0.09 |
| LAH | 0.05 | 0.05 | 0.08 | 0.07 | 0.11 | 0.10 | 0.17 | 0.14 |
| VNS | 0.11 | 0.08 | 0.16 | 0.15 | 0.18 | 0.18 | 0.25 | 0.23 |

* Indicates significant treatment effect at 95% confidence

Table 7.10: Logistic Regression Results: The Effect of Treatment on the Probability of Utilization of CNO-covered Services (odds ratios)
Treatment = Randomized to Treatment Group

| | Carle | | Carondelet | | LAH | | VNS | |
|--|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|
| | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted |
| Physician visits | | | | | | | | |
| Treatment | 0.98 | 0.97 | 0.98 | 0.98 | 0.94 | 0.94 | 1.02 | 1.02 |
| Post | 1.07* | 1.02 | 1.14* | 1.10* | 1.21* | 1.21* | 1.21* | 1.21* |
| Treat*Post | 1.00 | 1.00 | 1.01 | 1.00 | 1.03 | 1.03 | 1.00 | 1.00 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00 | --- | 1.00 |
| Past HH | --- | 1.00 | --- | 1.00 | --- | 1.00 | --- | 1.00 |
| Emergency room events | | | | | | | | |
| Treatment | 1.13 | 1.12 | 1.01 | 1.01 | 0.91 | 0.91 | 0.80 | 0.78 |
| Post | 1.34* | 1.24* | 1.16* | 1.11 | 1.23* | 1.19 | 1.17 | 1.13 |
| Treat*Post | 1.05 | 1.05 | 0.95 | 0.96 | 1.20 | 1.19 | 1.16 | 1.17 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.00* | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Skilled Nursing Facility admissions | | | | | | | | |
| Treatment | 0.93 | 0.89 | 1.07 | 1.04 | 0.79 | 0.77 | 1.41 | 1.37 |
| Post | 2.45* | 2.02* | 2.32* | 2.01* | 2.16* | 1.78* | 7.15* | 5.67* |
| Treat*Post | 1.01 | 1.02 | 0.88 | 0.89 | 1.49 | 1.48 | 0.98 | 1.01 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Inpatient hospital admissions | | | | | | | | |
| Treatment | 0.89 | 0.88 | 1.04 | 1.03 | 1.10 | 1.09 | 1.18 | 1.14 |
| Post | 1.19* | 1.12 | 1.21* | 1.14* | 1.49* | 1.37* | 1.71* | 1.63* |
| Treat*Post | 1.07 | 1.08 | 0.91 | 0.91 | 0.97 | 0.97 | 0.82 | 0.82 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Preventable hospitalizations | | | | | | | | |
| Treatment | 0.89 | 0.87 | 1.20 | 1.19 | 1.03 | 1.01 | 1.38 | 1.34 |
| Post | 1.21 | 1.07 | 1.49* | 1.37 | 1.49* | 1.33 | 1.69* | 1.61* |
| Treat*Post | 1.01 | 1.02 | 0.77 | 0.77 | 1.17 | 1.17 | 0.65 | 0.65 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.00 | --- | 1.01* |

* Indicates significant treatment effect at 95% confidence

Table 7.11: Logistic Regression Results: The Effect of Treatment on the Probability of Utilization of CNO-covered Services (odds ratios)

Treatment = Randomized to Treatment Group and Enrolled in CNO

| | Carle | | Carondelet | | LAH | | VNS | |
|--|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|
| | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted | Not risk-adjusted | Risk-adjusted |
| Physician visits | | | | | | | | |
| Treatment | 0.98 | 0.97 | 0.98 | 0.98 | 0.94 | 0.94 | 1.02 | 1.02 |
| Post | 1.06* | 1.03 | 1.14* | 1.10* | 1.20* | 1.20* | 1.22* | 1.21* |
| Treat*Post | 1.00 | 1.01 | 1.04 | 1.03 | 1.03 | 1.03 | 1.02 | 1.02 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00 | --- | 1.00 |
| Past HH | --- | 1.00 | --- | 1.00 | --- | 1.00 | --- | 1.00* |
| Emergency room events | | | | | | | | |
| Treatment | 1.13 | 1.12 | 1.01 | 1.01 | 0.91 | 0.91 | 0.80 | 0.78 |
| Post | 1.33* | 1.24 | 1.15* | 1.11 | 1.19 | 1.15 | 1.16 | 1.12 |
| Treat*Post | 1.03 | 1.04 | 0.93 | 0.93 | 1.19 | 1.20 | 1.10 | 1.10 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.00* | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Skilled Nursing Facility admissions | | | | | | | | |
| Treatment | 0.93 | 0.89 | 1.07 | 1.04 | 0.79 | 0.77 | 1.41 | 1.37 |
| Post | 2.31* | 1.93* | 2.18* | 1.90* | 2.02* | 1.65* | 6.21* | 5.04* |
| Treat*Post | 0.91 | 0.93 | 0.78 | 0.79 | 1.40 | 1.45 | 0.72 | 0.75 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Inpatient hospital admissions | | | | | | | | |
| Treatment | 0.89 | 0.88 | 1.03 | 1.03 | 1.10 | 1.09 | 1.18 | 1.14 |
| Post | 1.18* | 1.11 | 1.18* | 1.12 | 1.43* | 1.32* | 1.69* | 1.63* |
| Treat*Post | 1.05 | 1.06 | 0.88 | 0.88 | 0.95 | 0.96 | 0.78* | 0.78* |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.01* | --- | 1.01* |
| Preventable hospitalizations | | | | | | | | |
| Treatment | 0.89 | 0.87 | 1.20 | 1.19 | 1.03 | 1.00 | 1.38 | 1.34 |
| Post | 1.17 | 1.04 | 1.44 | 1.33 | 1.48 | 1.32 | 1.66* | 1.61* |
| Treat*Post | 0.98 | 0.99 | 0.65 | 0.66 | 1.10 | 1.11 | 0.64 | 0.64 |
| Age | --- | 1.00* | --- | 1.00* | --- | 1.00* | --- | 1.00* |
| Past HH | --- | 1.01* | --- | 1.01* | --- | 1.00 | --- | 1.01* |

* Indicates significant treatment effect at 95% confidence

this result and the fact that no other results in the table were significant, we conclude that enrollment in the CNO did not have systematic effects on utilization of non-CNO services, and that the single observed lower mean utilization rate of CNO enrollees relative to the control group was likely to be the result of nonrandom selection.

7.5 Conclusion

This chapter analyzed data from three different sources to determine whether enrollment in the CNO resulted in changes in patterns of utilization of health services. If CNO enrollment had improved health status, we would have expected utilization of both CNO-covered and non-CNO services to be less for the treatment groups than for the control groups. If the sites engaged in cost shifting to maximize their net revenues, we would have expected higher non-CNO utilization for the treatment groups. None of these patterns were observed in the data.

While survey responses indicated that members of the treatment group were more likely to receive a variety of services than were members of the control group, the survey data also revealed that the amounts of service received tended to be less. Medicare claims data and records kept by the sites showed that overall average levels of utilization for a wide variety of services were the same for treatment and control groups. This fundamental finding was not affected by including variables to adjust for differences in individual health risk.

Many of the analyses in this chapter also were conducted under a more restrictive definition of the treatment group, excluding those person-months when the beneficiary was not actually enrolled in the CNO. While this definition resulted in several significant differences between treatment and control groups, most disappeared when the analysis was risk-adjusted, suggesting that they were the products of selection bias.

Finally, timesheet and enrollment records indicated that expected efficiency gains from substitution of telephone for in-person contact were not realized. On the contrary, hours per enrollee were relatively constant after enrollment stabilized about 15 months after start-up, and the sites continued to commit growing resources to home visits years later.

The data, therefore, do not support the hypothesis that enrollment in the CNO had appreciable effects on the utilization of health services. While it is likely that some effects did occur, they were too small to be detectable.

8.0 Medicare Expenditures

8.1 Introduction

The cost effectiveness of the CNO intervention is assessed here by contrasting the total Medicare expenditures of the treatment and control groups from the time of randomization through the time at which data collection ceased. As shown in Chapter 3, the two groups were virtually identical in terms of measured health status at baseline. Furthermore, there was no evidence to suggest that the health and functional status of the two groups differed 27 months after randomization. If the CNO capitation rate and case management fee were appropriately set and if enrollment in the CNO does not cause members to seek non-CNO (in particular hospital and physician) services that they would not otherwise have used, then total Medicare expenditure for the treatment group should be lower than or comparable to that of the control group.

8.2 Analytic Approach

Expenditure data were compiled for the period from January 1994 through June 1997. Medicare outlays per month were calculated from the time of each individual's randomization (month 1) through June 1997. Hence a maximum of 42 months of expenditure data were available for each randomized person. Expenditures were classified as CNO or non-CNO expenditures, as follows:

Medicare Expenditures for CNO and non-CNO Services

| <i>CNO Service Package</i> | <i>Non-CNO services</i> |
|----------------------------------|--|
| CNO capitation payments | Inpatient hospital (short and long stay) |
| CNO case management payments | Hospital outpatient |
| Home health care (6 disciplines) | Skilled nursing facility |
| Outpatient physical therapy | Hospice |
| Durable medical equipment | Physician office visits |
| Prosthetics/orthotics | Physician other |
| Supplies | Part B other (lab, ancillary, other) |

In all comparisons between the treatment and control groups, two separate definitions of the treatment group were used. The first defined the treatment group as all individuals randomized to the treatment group, even if they did not subsequently enroll in the CNO or if they enrolled and later disenrolled from the CNO. The second defined the treatment group to consist only of individuals who were randomized to the treatment group and enrolled in the CNO. Under this second definition, individuals were retained in the treatment group for only those months during which they were actually enrolled in the CNO. Cumulative expenditures per person per month (PMPM) were computed for both groups by month of enrollment.

The chief drawback of the PMPM calculation for analytic purposes is that it tends to be heavily weighted by early program entrants. By contrast, *current month* computations tend to vary wildly from

month to month, making useful comparisons difficult. The six-month moving average of expenditure per person per month was computed for both total and non-CNO services.

Finally, we must consider use of out-of-plan services by beneficiaries enrolled in the CNO. The payment mechanism for the demonstration did not prevent CNO enrollees from receiving CNO-covered services under fee-for-service and did not prevent payment for these services even though the services ought to have been provided by the CNO and funded by the CNO's capitation payment. When such out-of-plan use was observed in the data, the Medicare expenditures paid to fee-for-service providers were added to the total for the treatment group. Under a national program, however, it is quite likely that payment for out-of-plan use would be prevented by a lock-out mechanism such as that now applied to Medicare risk HMOs.¹ To approximate expenditures as they would appear if a lock-out were in place, "trimmed expenditures" were also computed for the treatment group. This calculation removed all claims for CNO-covered services provided by fee-for-service providers to individuals currently enrolled in the CNO. For obvious reasons, total and trimmed expenditures per person must be identical for members of the control group.

Risk Adjustment

To investigate the relationship between the net Medicare cost or saving associated with the CNO and the characteristics of applicants, two methods of risk adjustment were employed. Each method partitioned the CNO applicant population into five ordered groups, by value of an indicator believed to be associated with increased Medicare expenditures. The first method used the so-called *probability of repeated admission* (P_{ra}) score (Boult, Pacala and Boult 1995). Because one of the data elements necessary to compute P_{ra} ("Is there a friend, relative, or neighbor who would take care of you for a few days, if necessary?") could not be secured from responses to the CNO baseline questionnaire, the approach of Pacala, Boult, Reed and Aliberti (1997) was used. This method uses the value of 0.7 rather than 0 or 1 for all respondents when calculating the P_{ra} . Baseline data were used to form five risk groups defined by quintiles in the distribution of the computed P_{ra} . Risk-adjusted expenditures were computed for the first 12 months of CNO enrollment only. Because five groups were constructed for each site, using a longer period would have produced an unacceptably small sample size per group for some sites.

The second method of risk adjustment used total Medicare expenditures over the 12-month period prior to random assignment to form risk groups. The distribution of total Medicare expenditure for each randomized individual was calculated separately by site for the 12-month period prior to randomization. Quintiles in the distribution of expenditure per person were again used to form risk groups.² Because the distribution of expenditure varied markedly from site to site, aggregate (across sites) risk-adjusted expenditure was not computed for this measure.

1 A lock-out mechanism was implemented for the extension of the CNO to 1998 and 1999.

2 Individuals who had been enrolled in Medicare for less than one year prior to randomization were eliminated from this analysis.

Threats to the Analysis

The analyses undertaken in this chapter are confronted by two problems that cannot be wholly resolved. The first of these is the appropriate treatment of individuals who are randomized to the treatment group but who either fail to enroll in the CNO or who drop out of the CNO. Following the principle of “intent to treat,” we have retained all such persons in the treatment group throughout the period after randomization. This procedure will tend to bias estimates of the treatment effect, positive or negative, toward zero. A natural alternative procedure, that of removing individuals from the treatment group when they disenroll, also leads to biased estimates due to the process of self selection. If, for example, those individuals who are least healthy and most likely to use health care services are most likely to drop out of the CNO, then mean expenditures, calculated for those who remain, would tend to fall. This decline in mean expenditures would have nothing to do with actions of the CNO, however. Rather it would simply reflect the sorting of high-expenditure individuals out of the treatment group. The computation of expenditure per member per month reported in the next section used both definitions of the treatment group.

The second analytic problem concerns the nature of the expenditure comparisons used to evaluate the net Medicare cost or saving associated with the CNO intervention. These comparisons are based on actual payments, including CNO capitation and case management payments, and thus are measures of the net cost or saving given the payment structure used for the demonstration. Whether the programs could exist at other, lower payment rates is more difficult to assess. Later in this chapter we compute the mean change in capitation and case-management payments necessary to achieve cost neutrality for the program.

8.3 Data

Part A expenditures were drawn from the National Claims History file via the HCFA Decision Support Access Facility (DSAF). All Part B data were extracted by HCFA staff using a finder file of Medicare numbers supplied by Abt Associates. Dollar values were aggregated to the person-month prior to estimation. Expenditures were declared to be missing values for those person-months after death, entry into a Medicare risk HMO, or loss of Medicare eligibility. Expenditures are expressed in 1997 dollars using the Consumer Price Index for discounting.

8.4 Results

Over the first 42 months of operation of the demonstration, total monthly Medicare expenditures per person were higher for the treatment group in all of the four sites. The difference in expenditure per month between the treatment and control groups was only eight percent at Carondelet, but as high as 18 percent at LAH. The dollar value of such expenditures for the first 36 months of operation are shown in Table 8.1 below. The discrepancy is not particularly sensitive to the method of defining the treatment group — all those assigned to treatment or only those enrolled in a given month. That is, total Medicare expenditure per person per month for all randomized beneficiaries assigned to the treatment group exceeded expenditures for currently enrolled CNO members by less than five percent in each of the CNO sites.

Trimmed expenditures, as described in Section 8.2, are also shown in the table. Although trimmed expenditures for CNO services are 8-15 percent lower than total expenditures for these services, they are nevertheless greater than expenditures for the control group in every instance.

Table 8.1: Medicare Expenditure per Person per Month, 36 Months after Random Assignment

| | | Total Medicare expenditure per month | | | | | | | |
|---|---|--------------------------------------|---------|----------------------|---------|---------------|---------|---------------|---------|
| | | <i>Carle-IL</i> | | <i>Carondelet-AZ</i> | | <i>LAH-MN</i> | | <i>VNS-NY</i> | |
| All randomized beneficiaries | T | \$365 | [\$355] | \$474 | [\$462] | \$429 | [\$423] | \$806 | [\$786] |
| | C | \$315 | | \$437 | | \$363 | | \$712 | |
| Randomized controls and currently-enrolled treatments | T | \$358 | [\$345] | \$474 | [\$459] | \$411 | [\$403] | \$805 | [\$781] |
| | C | \$315 | | \$437 | | \$363 | | \$712 | |

Services not covered by CNO

| | | <i>Carle-IL</i> | <i>Carondelet-AZ</i> | <i>LAH-MN</i> | <i>VNS-NY</i> |
|---|---|-----------------|----------------------|---------------|---------------|
| All randomized beneficiaries | T | \$285 | \$379 | \$345 | \$654 |
| | C | \$280 | \$385 | \$332 | \$619 |
| Randomized controls and currently-enrolled treatments | T | \$272 | \$375 | \$325 | \$639 |
| | C | \$280 | \$385 | \$332 | \$619 |

CNO-covered Services

| | | <i>Carle-IL</i> | <i>Carondelet-AZ</i> | <i>LAH-MN</i> | <i>VNS-NY</i> | | | | |
|---|---|-----------------|----------------------|---------------|---------------|------|--------|-------|---------|
| All randomized beneficiaries | T | \$80 | [\$70] | \$95 | [\$83] | \$84 | [\$78] | \$152 | [\$132] |
| | C | \$35 | | \$52 | | \$31 | | \$93 | |
| Randomized controls and currently-enrolled treatments | T | \$86 | [\$73] | \$99 | [\$84] | \$86 | [\$78] | \$166 | [\$142] |
| | C | \$35 | | \$52 | | \$31 | | \$93 | |

Note: Trimmed expenditures for treatment group appear in brackets. All figures are in 1997 dollars. These are population averages; all differences are statistically significant.

Figure 8.1 shows the time path of cumulative Medicare expenditure per-person per-month for individuals assigned to the treatment and control groups for each site. At each site, the discrepancy

between the treatment and control groups is quite small in the initial months following randomization. At Carondelet, total expenditures per member per month were actually smaller for the treatment group for about 10 months following randomization. Nevertheless, total Medicare outlays PMPM for the treatment group exceeded outlays for the control group by a more-or-less stable amount in every site by the time 25-30 months had elapsed from the date of randomization.

Figure 8.2 displays expenditure for non-CNO services. At Carle and LAH, expenditures for the treatment and control groups are nearly identical in this category. However at Carondelet and VNS, the expenditure for treatment and control groups differed for the first 24 months or so after random assignment. At Carondelet, non-CNO expenditures for the control group exceeded those for the treatment group by as much as \$100 over this period. At VNS, the treatment group expenditures were higher during the same period. In both cases, non-CNO expenditures eventually converged to near equality after about two years.

Figures 8.3 and 8.4 show the six-month moving average for the same two categories of expenditure. As expected, the paths exhibit greater month-to-month movement, although as in the previous figures, the path for each control group lies generally below that for the treatment group. At two of the four sites the discrepancy between treatment and control in expenditure per month tends to increase in the final few months of the series. It should be noted that the moving average expenditure, unlike the cumulative expenditure shown in Figures 8.1 and 8.2, are based on a progressively smaller number of individuals as the number of months increases. In order to contribute to the calculation for month 24, for example, an individual must have been randomized prior to June 1994.

Risk-adjusted expenditures for the treatment and control groups are shown in Table 8.2 for the P_{12} risk measure and in Table 8.3 for the prior-year risk measure. With the P_{12} used as a risk adjuster, mean expenditure for the treatment group is typically higher than for the control group in each of the four CNO sites. Although the treatment group exhibited lower total Medicare expenditure for one risk category in each of the four sites, the specific category of risk for which this was achieved showed no regularity across sites. At Carle, the treatment group exhibited slightly lower cost in the highest risk category, at Carondelet in the next-to-highest, at VNS in the next-to-lowest, and at LAH in the lowest.

When pre-randomization Medicare expenditure is used as a risk adjuster, treatment expenditure exceeds that for controls in nearly every instance. Expenditures for controls are larger in only two cases – for Carondelet in the middle quintile and for VNS in the next-to-lowest quintile. There is a barely discernable tendency for the relative discrepancies to be larger in the lower two quintiles than in the upper two. The expenditure for the treatment group exceeds that of the control group by more than 10 percent in six of the eight comparisons in the lower two quintiles, but only in three of the same eight comparisons in the upper two quintiles.

Figure 8.1:
Total Medicare Expenditure Per Person Per Month: All Randomized Persons

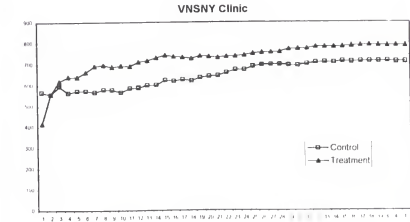
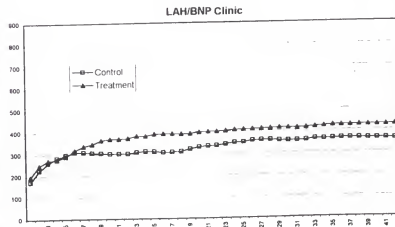
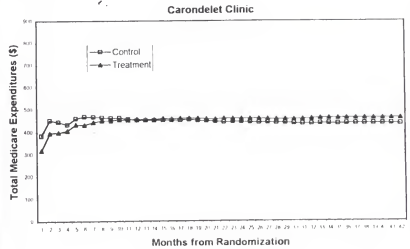
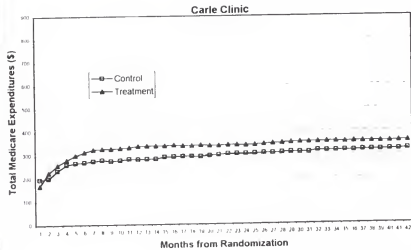
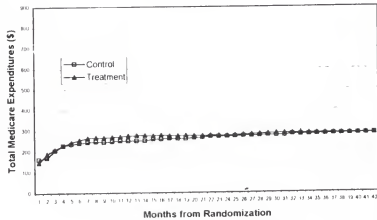
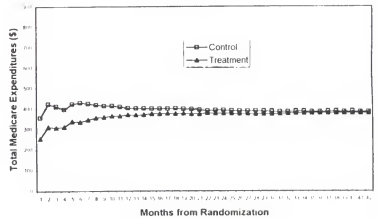


Figure 8.2:
Total Medicare Expenditure for Services not in CNO Package Per Person Per Month: All Randomized Persons

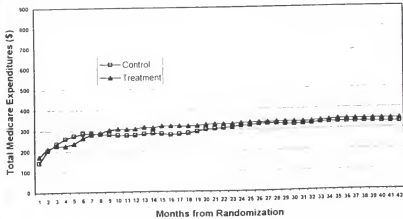
Carle Clinic



Carondelet Clinic



LAH/BNP Clinic



VNSNY Clinic

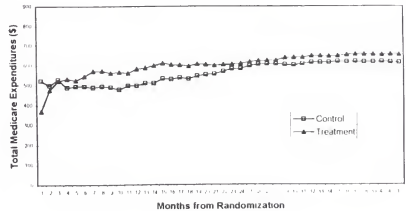


Figure 8.3:
Six Month Moving Average off Total Medicare Expenditure Per Member: All Randomized Persons

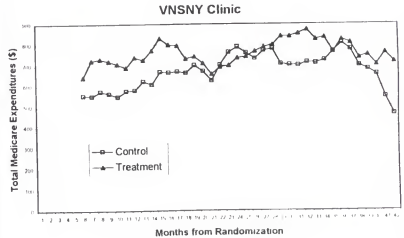
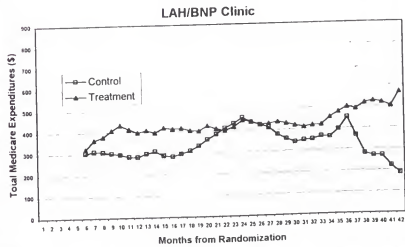
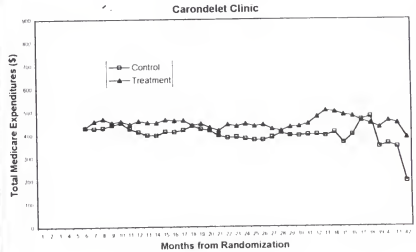
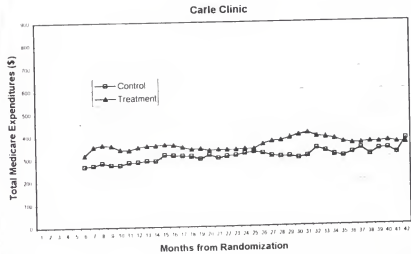


Figure 8.4:

Six Month Moving Average of Medicare Expenditure for Services not in the CNO Package Per Member: All Randomized Persons

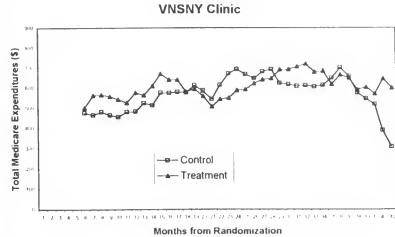
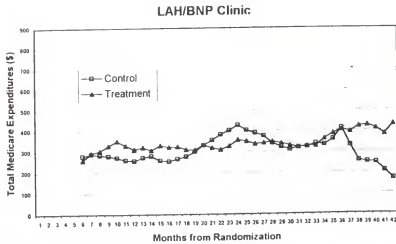
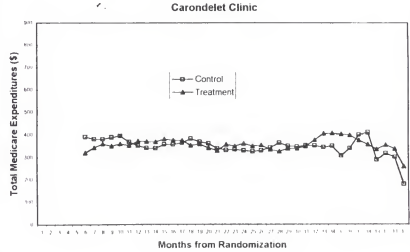
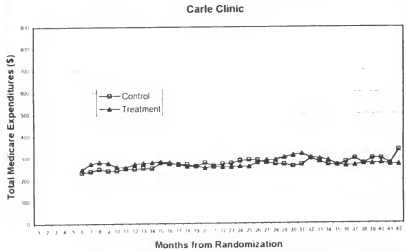


Table 8.2: Medicare Expenditure PMPM: Treatment and Control Groups for 36-Month Period Following Random Assignment: Risk Adjusted Using P_{12}

| Site | | Value of P_{12} | | | | |
|------------|---|-------------------|-------|-----------------|-------|------------------|
| | | lowest quintile | | middle quintile | | highest quintile |
| Carle | T | \$210 | \$283 | \$360 | \$389 | \$564 |
| | C | \$166 | \$266 | \$268 | \$334 | \$580 |
| Carondelet | T | \$325 | \$431 | \$422 | \$494 | \$728 |
| | C | \$261 | \$338 | \$415 | \$553 | \$626 |
| LAH | T | \$216 | \$303 | \$476 | \$474 | \$627 |
| | C | \$271 | \$220 | \$384 | \$377 | \$564 |
| VNS | T | \$463 | \$618 | \$829 | \$870 | \$1,236 |
| | C | \$406 | \$643 | \$628 | \$829 | \$1,149 |

Table 8.3: Medicare Expenditure per Person per Month for Treatment and Control Groups for 36-month Period Following Random Assignment: Risk Adjusted Using 12-month Pre-randomization Expenditure

| Site | | Value of 12-month pre-randomization Medicare expenditure | | | | |
|------------|---|--|-------|-----------------|---------|------------------|
| | | Lowest quintile | | Middle quintile | | Highest quintile |
| Carle | T | \$220 | \$231 | \$368 | \$413 | \$613 |
| | C | \$164 | \$190 | \$277 | \$383 | \$574 |
| Carondelet | T | \$248 | \$267 | \$416 | \$564 | \$913 |
| | C | \$224 | \$257 | \$428 | \$554 | \$761 |
| LAH | T | \$289 | \$300 | \$366 | \$459 | \$756 |
| | C | \$248 | \$188 | \$291 | \$431 | \$668 |
| VNS | T | \$408 | \$545 | \$685 | \$1,068 | \$1,373 |
| | C | \$344 | \$582 | \$611 | \$768 | \$1,279 |

8.5 Discussion

In all of the four CNO demonstration sites, overall Medicare expenditures per person per month were higher (by 8 to 18 percent) for the treatment than for the control group. Mean monthly expenditures for non-CNO services were comparable for the two groups in all sites. Hence the main impediment to achieving cost effectiveness for the CNOs is probably capitation and case management payments that were set too high. This probably occurred because the rates were set based on the average Medicare use (under fee-for-service) of services covered by the CNO plan. Our best estimates, based on data from previous reports, is that CNO applicants have turned out to be healthier than the average beneficiary. Thus members of the control group have tended to consume fewer services than those used to price the CNO bundle.

A rough approximation of the reduction in monthly CNO payments necessary to achieve budget neutrality is given by the difference between the trimmed monthly expenditure for the treatment group and the corresponding monthly mean expenditure for the control group in the top panel of Table 8.1. An alternative estimate results from comparing trimmed payments for CNO services to control group expenditures in this category as seen in the third panel of Table 8.1. These calculations suggest that budget neutrality payment reductions of \$35-\$40 per month at Carle, \$25-\$31 at Carondelet, \$47-\$60 at LAH, and \$39-\$74 at VNS.

8.6 References

Boult, C., J.T. Pacala, and L.B. Boult. Targeting elders for geriatric evaluation and management: reliability, validity and practicality of a questionnaire. *Aging Clin Exp Res* 7 (1995): 159-64.

Pacala, J. T., C. Boult, R.L. Reed, and E. Aliberti. Predictive validity of the P_n instrument among older recipients of managed care. *Journal of the American Geriatric Society* 45 (1997): 614-17.

9.0 The CNO Demonstration Sites

9.1 Introduction

As noted briefly in Chapter 2, the CNOs took multiple approaches to implementing the OBRA mandate. This chapter focuses on lessons learned from each site's experiences, particularly with respect to service delivery. Data on each site's path to operationalization are condensed, providing sufficient detail to highlight differences among sites.

Process data contributing to this analysis were collected during three waves of site visits as well as via telephone monitoring between visits. Results of the first and second waves of visits were reported in detail in the interim reports. The third wave of site visits was conducted in the summer of 1997 and is reflected below. Some topics, such as marketing, recruitment, and quality assurance have been omitted entirely from this report, and readers are referred to the first and second interim reports for details on those and other issues.

9.2 Carle Clinic

The Carle CNO employed CNO nurses at sites that also offered other Carle Clinic services. The nurses had specialized caseloads by risk level -- high-risk and low-risk -- and by the end of the demonstration they were identified as "high-risk" and "wellness" nurses, the latter having larger caseloads with fewer active issues. Notable highlights of Carle's CNO experiences include:

- *Use of case assistants to relieve nurses of some clerical tasks and routine monitoring.* This was a particularly important source of labor for telephone monitoring of low-risk rural enrollees, who were rarely seen in person. The concept of the case assistant emerged in the cost-conscious, private, for-profit organization of Carle Clinic. Similar strategies might emerge in other environments if CNOs had to operate with lower capitation rates than were implemented in this demonstration.
- *Development of formal partnerships between nurses and physicians and other members of interdisciplinary teams.* At the end of the demonstration, the Carle site achieved a service configuration that seems most likely to sustain the CNO nursing mission. That Carle Clinic is a physician-run organization did not discourage this from happening; in fact, it probably heightened awareness that the CNO intervention would eventually have to be incorporated into an interdisciplinary approach.
- *Increasing emphasis on risk assessment and structured decision making for service provision.* Carle started with a relatively unstructured approach to reviewing utilization data and a short-term approach to cost-containment. As the demonstration progressed, the Carle experiences paralleled those of managed care generally -- increasing emphasis on risk assessment and its relationship to cost savings in the long term.
- *Early conflicts with contracted providers who were reimbursed on a fee-for-service basis.* These conflicts were greatest with home health providers, for reasons discussed in Chapter 11, and all were diminished or resolved as providers gained more experience with managed care. Carle's

experiences in managing fee-for-service providers within a capitated demonstration and a cost-conscious environment are probably the most illustrative (among the CNO sites) of potential contractor issues outside of the demonstration environment

- **Nurse/Physician Relationships.** The CNO demonstration is one of a number of Carle initiatives in which nurses play a prominent role. Early in the demonstration, some previously isolated CNO nurses were relocated to be in the same clinics as their enrollees' primary care physicians. This facilitated communication between nurses and physicians and also enabled patients who needed physician office visits to meet with their CNO nurses in the same location. By the end of the demonstration, all Carle CNO nurses were formally paired with groups of physicians and other providers in several Carle facilities.

An early challenge for the nurses at the CNO sites was addressing physicians' reactions to the CNO and forging relationships with them. According to the CNO staff, Carle physicians were initially supportive of the CNO case management model because it did not encroach on their territory, and they saw it as beneficial because patient satisfaction was high. Several primary nurse providers (PNRs) noted that many primary care physicians realized that the PNP's were an asset because of their detailed knowledge of their patients' backgrounds and lifestyles. By the third year, high-risk nurses and wellness nurses assigned to groups of physicians focused, respectively, on continuity of care for heavy service users and pro-active care for relatively well enrollees. At the end of the demonstration, Carle physicians in these groups referred to the CNO nurses as their "eyes and ears," as the nurses had more opportunities than physicians to observe patient characteristics that have an impact on care. The physicians described their own involvement with patients as becoming more "episodic" in response to cost constraints. Some provided examples of decreasing time spent with patients per consultation and overall. They believed that the CNO nurse could provide continuity in this situation, emphasizing that the ambulatory care nurse or office nurse does not fulfill that role.

At the end of the demonstration, the Carle PNPs described their relationship with physicians as being interdependent, collaborative, and based on mutual respect. Each PNP viewed the enrollees in her caseload as her responsibility, rather than as the patients of particular physicians. The nurses maintained that they had the opportunity to provide care in a pro-active and holistic manner and to tailor their services to suit individual patients.

- **Risk Assessment/Service Decisions** Early on, Carle CNO staff defined three risk categories among their enrollees – high, moderate, and low – and decided to shift from mixed- to risk-group-based caseloads. Clients moved in and out of the moderate group, and nurses regularly assessed when a client was prepared to move back to the low-risk status. Those in the high-risk category needed a higher level of service provision to delay or avoid more costly services such as institutional care. The goal was to improve the client's functional level and educate her or him regarding signs and symptoms of conditions. Clients in the low-risk group were individuals with few functional limitations. They received health promotion information at the time of assessment, or through the mail. They might have received a monitoring call on a quarterly basis if they expressed a desire for this service, but the primary contact with them would take place during six-month reassessments.

From the first year of the demonstration, a service coordinator reviewed care plans and monitored utilization of services by CNO enrollees. The CNO analyzed data on utilization and patterns of care on a regular basis, and cases with the highest service utilization received a comprehensive review.

Utilization data was also shared with the nurses, who, from prior experience, were accustomed to examining utilization data from the perspective of cost containment. The original Carle CNO philosophy was to strengthen the informal support system, and place some of the health care responsibility on the client. Nurses were asked to be "creative" when planning care – not to use the traditional Medicare guidelines for service duration and frequency – and to look first to both the client and caregiver as resources. In principle, this philosophy was still embraced by the end of the demonstration, but it was paired with a focus on risk assessment that is expected to alter service delivery patterns in the long term.

By the second year, Carle CNO managers concluded from their data that health promotion for low-risk enrollees was costing more than it could yield in eventual savings. They increased efforts to better manage high-risk enrollees, as that approach appeared to offer more prospects for containing costs. By the third year, Carle CNO managers had moved to a longer-term perspective on risk assessment, focusing on predictors of heavy service use among enrollees in various risk categories. They expressed the belief that with increasing opportunities to participate in Medicare managed care programs, it will be important to be able to use "triggers" to identify potential heavy service users, particularly among those who appear to be at low risk at enrollment. Some of the predictors explored by Carle include polypharmacy, impairment in more than one ADL, and recent falls. To the extent that useful triggers can be identified, it is expected that service utilization guidelines will become more formal and nurses' decision making will be more circumscribed by guidelines.

9.3 Carondelet Health Care

The Carondelet CNO strategy employed nurse case managers – as they had traditionally been employed in the Carondelet system previously – for high-risk enrollees, and also employed "nurse partners" to circulate among community sites that were accessible to both low-risk CNO enrollees and other seniors. Additional, specialized personnel were available for health promotion and social services, and a volunteer program was implemented. Notable highlights of Carondelet's experiences are listed below.

- *Contending with fierce competition from other managed care programs in the area.* The Carondelet CNO developed a wide range of health promotion activities – including some that might be characterized as "frills" by other sites – as one means of differentiating itself from look-alike competitors. Competition remained a threat throughout the demonstration. Look-alike programs also present a problem in demonstrating the impact of the CNO, as many non-CNO seniors receive similar services from other programs.
- *Early use of structured risk assessment tools and a long-term perspective on cost-containment.* From the beginning of the demonstration, the Carondelet site expected that risk assessment and appropriate, even generous, service delivery up-front might prevent the use of costlier services in the long term. The site and its sponsoring institution were willing to risk early financial losses to implement this approach. Their confidence derived from previous research, including their own and published results of other experiments.
- *Centralized service authorization decisions and training of nurses for decision making.* The Carondelet CNO started with a service coordinator who was responsible for all authorization

decisions. This position, eventually shared by two coordinators, was continued throughout the demonstration, and the coordinators were also charged with educating the nurses in sound decision making. This CNO used decision trees and other structured tools to standardize decision making. Carondelet's efforts to structure service decisions foreshadowed the direction in which other CNO sites, and other managed care programs, would eventually move.

- **Promotion of the CNO, within its sponsoring institution, as an innovative nursing intervention.** This CNO was created in an environment that was very supportive of creative uses of nursing skills. Over time, new institutional priorities encouraged development of physician networks for managed care. At the time of the last site visit, it appeared that a new strategy was needed for the CNO nursing intervention to articulate with the work of Carondelet physicians.

- **Service Authorization.** The Carondelet CNO developed a strong approach to cost containment: a Service Coordinator as a centralized decision maker. The Service Coordinator's (SC) role in utilization review and resource identification was originally conceived of as a temporary position needed until the nurses reached a level of comfort with autonomous decision-making. The SC was so successful that management decided to retain her throughout the demonstration, and later a second service coordinator was added to collaborate on implementing common standards for service authorization. All records with service authorizations were reviewed by the SCs prior to final authorization. Nurses needed to justify their service decisions, but only 2 percent of all reviewed cases showed disagreement between an SC and a PNP. (In the first operational year, 10 percent of reviewed cases showed disagreement.) An on-going dialogue between the SCs and PNP's helped the nurses to learn, on a case-by-case basis, how to consider CNO goals when making decisions.

The PNP's viewed the SC as invaluable; rather than seeing her as a gatekeeper, the nurses saw her as a source of information and resources, and as a respected educator. The SCs and PNP's used a comprehensive set of markers developed by the CNO to indicate when a client should transition to a different level of care. The site also developed decision trees illustrating criteria for making a variety of care decisions. All Carondelet CNO nurses were trained with these tools. They showed, for example, that clients should move from the moderate- to high-risk group when there is a major change in health status or cognitive functioning. The program's goal was to move the client back to moderate risk as soon as possible through the use of necessary supports and education.

The SCs developed a computerized authorization process to review beyond-Medicare services. It was based on the decision-making trees formulated by the CNO, although these rules were not rigid. The process adhered to Medicare guidelines but also incorporated the flexibility available to the CNO. Reports indicate that services beyond Medicare limits amounted to approximately 4 percent of all services provided. This information has helped to dispel the commonly held belief among CHC management that the CNO is providing many services in excess of what Medicare would normally approve. The data also show that physicians, rather than nurses, authorized the majority of beyond Medicare services – which emphasizes the need for CNO nurses to work closely with physicians.

In general, the Carondelet CNO worked more on analyzing and standardizing decision making than the other demonstration sites. The development of standards for service utilization was guided by research that emphasized justification for decisions. Service authorization protocols helped nurses think through the rationale behind offering services and had the effect of standardizing service decisions among the nurses. The nursing staff received on-going training on how to use data to guide

their daily practice and on the latest developments in outcomes research. They continually reviewed utilization data as a means of understanding decision-making patterns that underlie utilization. Service utilization standards addressed managing risk through three strategies: care coordination, integration, and case management. High-risk case management adhered to clinical guidelines and focused on early risk identification, targeted interventions and evaluations. The goals of this model were patient satisfaction, symptom relief, reduced hospitalization and emergency room use, and reduced costs. The care of low risk individuals centered around monitoring, prevention and health promotion activities.

The nurses were aware of cost-containment issues, but considered the provision of fewer services, when warranted, to be primarily an issue of properly defining clients' needs and promoting independence by not providing more than clients needed. PNPs encouraged enrollees to be their own advocates and to draw on family and other local resources whenever possible. PNPs also enjoyed the freedom to provide services for reasons of prevention – to provide, for example, some therapy to prevent a fall, rather than waiting until therapy was necessary for rehabilitation.

Most Carondelet nurses had experience with capitation prior to joining the CNO. However, they noted that the CNO model was less focused on cost containment and more focused on providing quality care. For nurses who had experience in home health prior to joining the CNO, productivity analyses were not new. Nurses without home health experience had to become accustomed to reviewing cost and utilization data. There was an on-going process to translate financial information into a format that the nurses could use to see how clinical practice and finances are related. The nurses were provided with information on the cost of service delivery by type of service and by location to show contrasts in costs. This information helped them to prioritize plans for future activities; for example, what would be the best use of surplus monies in the health education budget given the projected cost of proposed activities. The information also demonstrated to the nurses that cost-effective care results in positive measurable patient outcomes while maintaining costs at a minimum.

9.4 The Living at Home/Block Nurse Program CNO

The LAH CNO strategy utilized nurses – employed by LAH's demonstration partner, HealthSpan – who managed mixed caseloads and were stationed at community-based sites that were dedicated to the CNO. These sites also employed community coordinators to identify community resources and handle a variety of non-nursing tasks, and utilized a variety of volunteer services. Notable highlights of LAH's CNO experiences include:

- *A strong community focus, consistent with its parent organization's mission.* This was reflected in the use and impact of a community advisory committee and in the role of the community coordinator at each CNO site. To an outsider, it was clear that the community coordinator was able to relieve the nurses of some non-nursing work, but locally the job was often perceived as the linchpin of a community service site, which included nursing among its services.
- *Extensive and creative uses of volunteers, in the spirit of local traditions of volunteerism.* Volunteer activities included household assistance and clerical duties, as well as some activities that might enhance clinical outcomes -- such as walking with a patient who had recently finished a course

of physical therapy but might not be sufficiently confident to continue exercising without encouragement. Some volunteers were CNO enrollees, and the program appeared to have some quality-of-life benefits for them.

- *Little direction for risk assessment and service authorization by nurses.* LAH was somewhat resistant to the risk assessment/structured decision making trends of managed care. However, by mid-demonstration, nurses were hearing cost-containment messages that emphasized savings in the short term. Over time, and with some reconfiguration of HealthSpan personnel, there was increasing interest in the use of utilization data to influence service decisions and patient outcomes in the long term.
- *Development of productive, informal working relationships with rural physicians.* The LAH CNO nurses at rural sites established good working relationships with physicians who served large numbers of CNO patients. These relationships developed informally, through repeated contacts between the nurses and physicians, but they functioned very much like the formal nurse/physician relationships at Carle Clinic. In urban areas, CNO enrollees were served by more physicians, each with a small number of CNO patients. While some progress was made, it was harder for CNO nurses to develop working relationships with the urban physicians.
- *Community Coordinators.* Each of the four LAH CNO sites had a Community Coordinator (CC), who played a major role in recruiting, training, and supervising the volunteers: identifying resources in the community; and linking those resources to enrollees. The most commonly expressed needs were for transportation, volunteer services, chore services, and assistance with living wills. The CCs also performed follow-up assessments when the PNs suspected that enrollees had problems that were not being addressed. Follow-up assessments were more likely to occur when the first assessment/reassessment was performed in the office and not the home. By going to enrollees' homes, CCs were able to observe problems, such as environmental hazards, that could negatively affect enrollees' health status. Coordinators also educated the community about the presence of the CNO, and they participated in case conferences with the nurses, when appropriate.

For some low-risk enrollees, the Community Coordinator was more actively involved than the nurse, and, operationally, Community Coordinators appeared to be the key staff member at some of the LAH/BNP sites. Given the large, mixed caseloads, this partnership worked well. Only 14 percent of all enrollees received direct services from PNs, whereas 61 percent received services from the community coordinators. Each group tapped into the other's strengths, allowing an enrollee to receive comprehensive nursing and social services when needed, while providing significant services to enrollees who did not need nursing services. The approach may have saved additional costs because enrollees benefitted from community resources identified by the Coordinator that could be used with no cost to the CNO.

Aside from the possible impact on cost, collaboration with the CC may have been a factor in LAH PNs having been able to maintain mixed caseloads. At CNOs such as Carle and Carondelet, where most nurses had mixed caseloads, an enrollee could be moved from a low-risk to a high-risk category when conditions changed, and the number of enrollees in a high-risk caseload could be adjusted. For LAH nurses, with mixed caseloads, the number of enrollees assigned to them might have been constant, but the number of active cases might have changed frequently and been difficult to predict. By the time of the last site visit, the nurses were feeling strained and proposing changes in caseload

assignments. It is possible that this issue would have arisen and required change much earlier if the nurses had not been relieved of a significant number of non-nursing duties performed by the CC

- *Volunteers.* The LAH/BNP philosophy emphasized the use of volunteers. The project had 237 volunteers by the beginning of 1996, and each site had a group of volunteers who could perform services such as providing transportation to appointments, shopping for a homebound enrollee, being a "friendly visitor," and providing clerical assistance for a CNO site. Many of the volunteers were also CNO enrollees. Approximately eleven percent of all enrollees were volunteers, and they appeared to have a qualitatively different experience in the CNO from that of non-volunteers. The site visitors talked to volunteer/enrollees at length, and noted that they appeared to take great pride in being able to help others, while at times (or in the future) they might themselves need to be on the receiving end of help from volunteers. Some stated that the major incentive to enroll and remain in the CNO was the opportunity to volunteer. Others stated that the opportunity to keep busy helped distract them from their own problems, and some said that they hoped to recover from their own ailments quickly so that they could resume their work as volunteers. Several expressed the view that being a volunteer was similar to being a member of a social club -- one woman thought the volunteer activities were the primary purpose of the CNO. In general, the volunteer experience seems to have fostered a sense of "connectedness" to the program. Volunteer services also appear to have been well integrated with the care provided by the CNO. For example, some recipients said that without the volunteers' services they would not have been able to stay in their own homes after hospitalization without additional, paid home help. Volunteers believed that they were sufficiently trained to notice and report a problem that needed a nurse's attention.

- *Nurse/Physician Relationships.* The LAH/BNP CNO did not emphasize PNP/physician coordination because the sponsoring organization of the CNO did not employ physicians, and enrollees use physician services that were widely dispersed. Nevertheless, relationships between PNPs and physicians were considered positive from the first year of operations. As physicians gained a better understanding of the CNO, more of them began involving the PNPs in discharge planning and post-hospitalization care. The nature of the nurse-physician relationship varied by location. The PNPs at rural sites reported more one-on-one contacts with physicians. An evaluator interviewed some rural physicians and found that their descriptions of the relationship and the role of the CNO PNP were almost identical to the comments of the Carle physicians who were formally teamed with CNO nurses. PNPs at urban sites had fewer opportunities to form close working relationships with physicians, but by the third year, even urban physicians were aware of the CNO nurses, and their views were generally positive.

9.5 The Visiting Nurse Service of New York CNO

The VNS CNO strategy employed nurses who managed mixed caseloads and who circulated among sites in community settings that were accessible to both CNO enrollees and other seniors. The CNO nurses also delivered skilled home care to their CNO patients. VNS CNO nurses had no non-nursing assistance on site, but they did have a portable computerized record-keeping system that may have reduced some paperwork, and a variety of specialized psychosocial services were available as resources. Notable highlights of VNS's CNO experiences include:

- *Care of the neediest population in the demonstration.* VNS CNO enrollees were older, sicker, and poorer than enrollees at other sites and were more likely to live alone. This population was also ethnically diverse, including a large number of individuals with psychosocial problems and many who had not had a regular primary care provider for some time. Some VNS CNO enrollees were also inclined to seek services from other sources if denied by the CNO.
- *Lack of cooperation from most area physicians.* CNO nurses maintained that local physicians viewed them as competition, and most were unwilling to form working relationships with nurses. The large number of physicians in the community – each likely to have very little experience with CNO patients – also mitigated against the formation of partnerships. As more physicians in the area became involved in managed care, and realized the advantages of collaborating with non-physician providers, some attitudes began to change.
- *Little direction for risk assessment and service authorization by nurses.* There seemed to be an assumption that CNO nurses would learn by doing, by sharing knowledge with their colleagues, and by processing feedback from periodic utilization reviews. By mid-demonstration, cost-containment messages appeared to influence nurses' decisions. In the second half of the demonstration, there was increasing interest in understanding and modifying high service usage among some types of enrollees.
- *Heavy emphasis on the management of home health care.* By mid-demonstration, financial viability was associated with the successful management of patients in higher rate cells who could be heavy users of services. As home health was the high-cost service most familiar to VNS, and it was within the CNO capitation rate, the VNS CNO focused on reducing home health visits. This site was less focused than other CNO sites on the management of all Medicare benefits for long-term improvements in patient outcomes and costs.
- *Comprehensive Roles of Nurses.* PNPs served as the main primary care provider for many enrollees, particularly those who had outlived their primary care physicians and were unable or did not want to select a new one. In these cases, PNPs sometimes needed to find a physician who could write a prescription or perform another service that the PNP could perform under state practice guidelines. In other cases, PNPs tried to coordinate with physicians that treated the enrollees. PNPs spent much of their time checking on the health status of enrollees with chronic problems, answering health-related questions, and dispensing preventive advice.

VNS PNPs also provided home care, and they paid particular attention to issues of time management as they related to treating homebound versus mobile patients who received care at the community sites. Nursing management observed that the nurses managed their time more efficiently during home visits than they did at the community sites. This was because home visits were scheduled, whereas at the sites clients were free to drop in and might have monopolized the nurse's time so that she was unable to care for all who were in need of service. Part of the problem was that many of the enrollees were lonely and needed someone with whom to talk.

While working at the community sites or visiting individual enrollees, the PNPs entered patient data and case notes into laptop computers. At night they uploaded the data via modems to the host, and the host downloaded data that updated the patient records in the laptop memories. The system also included files in which nurses documented the time they spent in administrative and clinical duties. Each nurse had access only to the records of patients in her caseload, but records could be transferred

if patients were reassigned to a different nurse. This computerized system minimized paperwork and the need to maintain paper records. Currently, the only paper records kept are consent forms and notes of the contracted providers, who do not have access to the computerized system.

- *Nurse/Physician Relationships.* PNs at different VNS sites had varied experiences coordinating with local physicians. Physicians who liked the CNO sought to be collaborative, often referring patients back to their nurses. Those who did not like the program were particularly resentful of the PNs authorizing services. According to the CNO staff, some physicians thought that this led to a reduction in their business and placed them in direct competition with the PNs for patients. Some potential applicants were afraid to displease their physicians and thus were hesitant about joining the CNO. Some enrollees asked their PNs not to communicate with their physicians, preferring instead to conceal their enrollment in the CNO. The nurses tried to allay these fears by explaining to potential applicants and to enrollees how nurse case management services could enhance medical care and provide additional benefits that were not available from physicians.

An evaluator spoke to one physician in the community who had positive experiences with a CNO nurse. His comments were similar to those of the physicians who worked with Carle and LAH nurses. He spoke especially of the impact on continuity of care that a CNO-type nursing role might have. Unfortunately, there seem to have been few physicians in the VNS community who were this receptive to the CNO. It is possible that as more New York City physicians sign managed care contracts, and deal with more cost constraints, their views might change.

- *Psychosocial Services.* The VNSNY demonstration site (more so than the other three sites) used social services in a preventive manner for enrollees in all risk categories. The VNSNY CNO had a diverse enrollee population that was older, sicker, and had more individuals living alone than enrollee populations at other CNO sites. Enrollees' social concerns and issues were considered risk factors and were given significant attention. Many enrollees suffered from isolation or had other psychosocial problems that, the Site Director and PNs believe, often became somatized. The nurses, in conjunction with a social worker, would identify an enrollee's risk for illness and help that enrollee manage and better cope with the situation. Grief counseling (such as for death or loss of independence) was provided frequently. Masters-prepared social workers provided counseling services, as opposed to providing resource identification and brokerage of services. A psychologist and a psychiatric nurse practitioner were also available under contract.

10.0 Cross-Case Observations Based on the Site Studies

10.1 Introduction

Since the start of the Community Nursing Organization (CNO) Demonstration in January 1994, there have been fundamental changes in health care delivery, particularly with the emergence of managed care. Some of the original expectations of the demonstration, such as cost containment, now seem dated. In the early 1990s, managed care organizations (MCOs) were interested in substituting less-costly mid-level providers for physicians as the new “gatekeepers” to care. Those who advocated the CNO model proposed containing unnecessary costs by situating nurses in this pivotal role as case managers. Proponents of the CNO model were also interested in promoting patient “wellness” through health education and preventive care. This emphasis on prevention was viewed as beneficial to the health of demonstration participants, and likely to reduce future health care expenditures.

By the late 1990s, nurse case management and preventive interventions had not proved to be guarantees of cost containment. “Wellness” promotion proved to be expensive, and MCO beneficiaries were often not enrolled long enough to recoup the investment (Rosenthal, 1997). The managed care industry’s attention shifted from the substitution of nurses for physicians, to promoting the management role of Primary Care Physicians (PCPs) and minimizing the role of physician specialists. Additionally, increasingly sophisticated approaches to risk assessment were considered as viable means of long-term cost-containment.

This chapter addresses how the CNO sites have performed and adapted to this changing environment. While there are regional and cultural differences among the four CNO sites, there are lessons to be drawn from the similar approaches that characterize each site’s experience with the managed care industry.

10.2 Increasing Emphasis on Risk Assessment

The two fundamental concepts of the CNO are capitated payment and nurse case management. Capitation was expected to provide an incentive to contain costs. Nurse case management was expected to promote the timely and appropriate use of community nursing and ambulatory care services, reducing the use of costly acute care services.

In a fee-for-service environment, there are many incentives to provide tests and treatment to generate additional payment. These incentives are the basis of the argument for capitated payment. Does capitated payment reduce service utilization? The second annual report suggested that it might not. Even in a capitated environment, services that might not be deemed strictly “necessary” are provided in an effort to minimize risk for the patient and the provider.

Prior to the CNO Demonstration, nurses followed this paradigm of *risk*, which led to large allotments of discretionary care. From the nurses’ point of view, risk had two sources. First, the patients’ families and resources were unknown. The second related source of risk was not having an

established and enduring relationship with the patient. Before the CNO demonstration, the major method of minimizing risk was providing the maximum amount of service that would be reimbursed by Medicare. A typical example, provided by CNO nurses, of pre-CNO decision making about home care visits would be

“We don’t know this patient or her home situation. Let’s give her all the home visits that Medicare will pay for, even if there’s a chance that she might not need that many.”

A typical example of pre-CNO decision making about this same patient, a few visits later, would be

“She might do just as well without the remaining visits, but we don’t know her that much better than when this episode started. Besides, if something went wrong we wouldn’t necessarily know it. We can’t be sure the patient or her family would call us in time. So let’s give her everything that Medicare will allow.”

or

“I’d be afraid to leave her completely on her own, but maybe she no longer needs skilled nursing care. No, if Medicare will pay for a nurse, it’s better to have a nurse in the home who can really understand the patient’s condition.”

In contrast, a central hypothesis of the CNO was that risk could be minimized through a continuous relationship between nurse case manager and patient. Based on this relationship and their insight into the patients’ situations, CNO nurses made decisions about health care services. They also expected to be a part of the patient’s care even following episodes of acute care. CNO nurses spoke with confidence about their ability to detect and avert a premature withdrawal of service. Not surprisingly, at some sites it was believed that within the CNO demonstration they had reduced the amount of home care that is usually provided per acute episode. One site had documented statistics verifying such a change.

Thus, a Medicare program intervention combining capitated payment and nurse case management seems well founded. Capitation provides an incentive to reduce services and contain costs, while case management provides a means to minimize the risk inherent in the reduction of services. Both nurses and patients appear to accept the latter association in the CNO demonstration. In this way, improved service coordination can reduce costs for heavy users of Medicare services. This logic is derived from nurses’ experiences in a non-CNO environment. However, the strategy was initially implemented in different ways at each CNO site.

Carondelet started with the most centralized service authorizations system. This site had the earliest and most standardized guidelines for service, and provided the most instruction to its nurses for conducting risk assessments. Notably at Carondelet, during the first year of the demonstration, several nurse practitioners, who had been used to functioning autonomously, dropped out of the CNO demonstration because of a perceived lack of autonomy relative to their prior experience. From the beginning of the project, Carondelet centralized its service authorization decisions through a Service Coordinator, and later through two Coordinators working together. The focus was on a structured approach to risk assessment, primarily for high-risk patients. As described by the nurses, the SCs functioned as mentors, helping the PNP’s to learn sound principles of risk assessment and service

authorization. This educational process did not happen quickly. However, by the second year of service delivery, there was only 2 percent disagreement between the decisions that the nurses made and those of the Service Coordinator, who would prevail.

Most of the other sites explained the initial lack of centralized decision making by their desire to promote creative thinking among the nurses. However, much of the input provided to nurses about service authorizations concerned the need for cost containment, and PNP's rationalizations for CNO service decisions in the early stages of the demonstration often cited cost concerns. At some sites, nurses often recited lists of interventions they might provide, without clearly articulated reasons for providing those interventions. Rationales for service provision were most easily and clearly provided when they related to cost containment. Many of these decisions dealt with short-term trade-offs, savings in the immediate cost of one type of service versus another. In contrast, at Carondelet from the beginning the PNPs clearly articulated concepts of patient risk assessment that addressed the issues of risk noted in nurses' discussions of pre-CNO service decisions. The trade-offs that PNPs discussed were more likely to be long-term, such as the provision of a service now to avoid patient decline and the need for more extensive treatment later.

At all sites, prior to the CNO demonstration most nurses had little training and experience with risk assessment. The encouragement of independent thinking, along with cost-containment messages from managers, did not always produce the desired result. An earlier report suggested that for CNO nurses, a firm grounding in risk assessment and an understanding of how good clinical outcomes can be achieved in the long run may be critical to the success of the demonstration.

By the third year, all sites had come to understand what MCOs had learned over this decade: an emphasis on short-term cost containment can defeat the objective of improved patient outcomes and decreased costs in the long term. In most cases, site directors became more comfortable with the idea that money spent early would likely save money later. This was reflected in how the role of the PNP evolved. As one site director stated, "If you see that role as a gatekeeper, you lose the game." There was more emphasis on "continuity," which was seen as related to the concept of "knowing the patient," and contributing to the ability to decrease utilization with less risk.

Concurrently, it became clear that an early assumption of the demonstration had been incorrect. Initially, most site directors thought that large numbers of relatively well enrollees, who did not need many health care services, would guarantee financial viability of a CNO. Only two years into the demonstration, it was clear that, given the lower rate structure of the demonstration, sites could ill afford the costs of prevention and promotion services for well enrollees. Furthermore, provision of those services did not help to predict or prevent high future costs. CNO sites received higher rates for sicker enrollees. It became clear that sites could save money by managing the care of heavy service users. An obvious threat to quality of care is inherent in this context, however.

By the third year, all CNO sites had some focused approach to risk assessment, particularly in predicting heavy utilization. In part, this emphasis evolved from the demonstration, in part, CNO institutions were mastering the skills and knowledge needed to participate in other managed care programs. Carle was examining its own data extensively to identify predictors of high cost. LAH and VNS were more focused on reviewing costs of heavy service users. All of the sites found it difficult to predict risk for relatively healthy enrollees, but they had identified some symptoms (e.g., polypharmacy, recent falls) of later poor health. In general, all of the sites had recognized the need to

integrate clinical and financial management toward the achievement of their overall objectives. It is likely that future CNO-type efforts will have a shorter learning curve on this issue as the lessons of the managed care industry become integrated into the health care environment.

10.3 Increasing Emphasis on Functionality

While patient functionality is not usually a primary concern of nurses, particularly for hospital trained staff, CNO nurses were increasingly focused on maintenance and improvement of enrollees' functional level. This focus on keeping enrollees functioning in the community (through exercise, therapy to prevent a fall, incontinence programs, etc.) may be one of the clearest ways in which a CNO can demonstrate that it is truly community-based. Some of the nurses state that this emphasis will eventually pay-off in decreased hospitalizations, particularly with respect to broken bones resulting from falls, and decreased nursing home admissions, with respect to timely services addressing incontinence. There are also quality-of-life objectives underlying this approach, which is another developing aspect of a program that seeks to serve a large number of relatively well elderly. How much time is actually needed for this emphasis on functionality to have an impact on costs, however, is still unknown.

A previous report noted a related emphasis in CNO nurses' discussions of service decisions regarding the promotion of independence among their patients. It was noted that this emphasis on promoting autonomy among patients can lead providers to believe that their patients' well-being can be furthered by the use of fewer services. Such a belief clearly can be associated with a service authorization pattern focused on cost containment and can have a variety of impacts on patient outcomes, depending on the nurses' perspective. During the latter phase of the demonstration, an emphasis on independence and autonomy seemed more clearly related to improvement of *functionality*, which seemed to be a positive development.

10.4 The Evolving Roles of Nurses and Physicians

The CNO nursing intervention is of interest not only with respect to its possible impact on outcomes, but also with respect to a modern reconfiguration of the roles of health care providers. The demonstration's nursing intervention was heavily focused on maximizing continuity of care through monitoring and case management while minimizing service fragmentation for heavy users of services. Over time, the CNO monitoring intervention had increasingly been characterized as a source of "continuity" in a health care environment in which physicians describe their experiences with patients as becoming more "episodic." The role of the CNO nurse is surely in line with the current trend to move health care out of high-cost institutions into a community-based environment.

The working relationships between CNO nurses and physicians at the end of the demonstration were more difficult to categorize. The CNO nurses had not become substitutes for primary care physicians, not even in New York City where many CNO enrollees did not have a primary care physician prior to enrollment. As noted, they also did not fulfill a conventional gatekeeper role. At the end of the demonstration, the CNO nurses seem to personify a trend noted by Buchhaus and Staiger: "Nurses engaged in managed care form 'partnerships and networks at the organizational level...practicing as members of integrated care delivery teams.'" Some of these arrangements were quite formal, while

others were still developing. Both nurses and primary care physicians are presumed to be needed, with the need for continuity increasing over time.

It is important to note that the conventional ambulatory care or “office” nurses, who assist physicians in the delivery of episodic care, have not assumed this new role of a community-based nurse. While the trend may be driven more by financial necessity than by a focus on prevention, promotion, and the other objectives of the original CNO model, the CNO demonstration can reasonably be said to reflect the development of a newly emerging capacity of nursing.

An interesting observation can be made regarding the emerging bottom tier in the organization of care delivery teams. Just as the development of community nursing is related to financial constraints on physicians’ time, such constraints are developing on nurses’ time. Note that some sites used other types of personnel to relieve nurses of non-nursing tasks; in particular, Carle used case assistants and LAH used community coordinators and volunteers. If CNO sites were operating with lower rates, it is likely that all sites would come to rely on non-professional personnel to assist nurses with clerical and social services.

10.5 Demonstration Constraints

In this subsection, we identify aspects of the demonstration’s structure that should not exist in a “real-world” implementation of CNOs. For example, section two of this chapter noted that the rate structure designed for the CNO demonstration may create incentives for sites to provide fewer preventive services for individuals in lower rate cells, or to provide less care for sicker individuals in higher rate cells. Quality controls, or other means of addressing these misplaced incentives, must be considered in the structure of a future CNO program.

A previous report noted an inherent contradiction in this demonstration: the CNO sites were evaluated for their impact on *all* Medicare expenditures. However, each site was only expected to manage a limited number of Medicare services within its capitation rate. Some high-cost services, e.g., hospitalization, nursing home use, and physician consultations, were excluded. A short-sighted CNO manager, or a manager under pressure by a host institution, might be tempted to focus on managing only the services that show up on the project balance sheet. Indeed, at mid-demonstration, the site that appeared to be the most cost-effective from the point of view of overall Medicare expenditures was also the site that was struggling the most financially. Sites that were less cost-effective for Medicare were clearly in the black — a situation appreciated more by their host institutions than by those who wished to learn how to manage Medicare benefits. A worse scenario would be presented by a site that focused on reducing a service within its capitation rate, such as home health care, while being unaware that costs outside of its capitation rate (such as hospitalization) were increasing and long-term patient outcomes were declining. In such a case, these incentives would be seriously in need of realignment.

A third constraint of the demonstration concerns the relationship between the CNO and home health care providers. One CNO site was sponsored by a home health agency; another partnered with a home health agency with which it had a risk-sharing arrangement, and which provided all the CNO nurses for the demonstration. For the other two sites, home health care was a contracted service. The difficulties of implementing a CNO demonstration with a home health agency as an external

contracted provider were particularly evident at the one for-profit institution in the demonstration (Carle), although the problems observed are more likely to be widespread outside of the demonstration environment. Succinctly, if the contracted home health agency is reimbursed on a fee-for-service basis, there is little incentive to support the demonstration. The home health agency will have an incentive to provide more home health, while the CNO nurses will have an incentive to provide less.

As explained in the second annual report, other contracted providers, such as providers of DME or physical therapy, expect that their market would reconfigure in a managed care environment. This perhaps would result in fewer services for more people, some of them at earlier stages of illness and functional impairment, for the purpose of prevention (e.g., a walker or PT to prevent future falls). However, "preventive" home health, particularly with respect to skilled nursing, is not a marketable concept. Risk sharing with a home health agency could also be problematic if it splits decision making between the CNO nurse and a home health agency employee. In this case, the problematic experience with home health at one site was more instructive than the sum of home health experience at all sites, and some of the issues will require resolution outside of the demonstration environment.

10.6 Impact of Cultural Differences

Considering institutional culture is a valuable part of a process analysis. For example, a community-based volunteer agency, a home health agency, and a physician group practice would each be expected to implement a CNO differently. The widespread use of volunteers by the LAH CNO site is one way in which institutional culture has shaped the characteristics of one CNO site. Also evident in this demonstration has been the impact of the cultures of the populations served on the programmatic structure of the demonstration sites.

Although the evaluation was not designed to focus on cultural differences, such differences were evident from the beginning. In the LAH environment, the emphasis of the population was on self-help and volunteerism. In contrast, VNS served a more help-seeking, less-advantaged population. The self-sufficient rural population served by Carle shared some characteristics with the winter-vacationing retirees served by Carondelet. However, Carondelet was also beginning to serve a Hispanic population with different programmatic needs and addressed the cultural differences up front. The CNO sites anticipated and accommodated these cultural differences so well that in this respect they appear to have surpassed the efforts of many managed care organizations which have attempted to serve new populations without understanding cultural preferences. These preferences impact enrollees' care-seeking behavior and satisfaction. The CNOs' experiences emphasize that there is no all-purpose formula that can be used to implement a community-based managed care intervention. The need to understand and accommodate cultural preferences appears to have been taken seriously by all CNO sites.

10.7 Future Directions

Evaluators have noted the importance of risk assessment and the increased efforts of the CNO sites to refine methods of risk assessment in order to inform decisions about care. This approach, which parallels efforts of managed care in general, may eventually contribute to more cost-effective care and should be encouraged. Evaluators have also noted the financial disincentive to provide some of the

most expensive services under the CNO capitation rate. This constraint could perhaps be remedied outside of the demonstration environment. The encouragement of risk-based decision making about care, and modification of the CNO capitation structure, might help to contain costs for Medicare.

One final concern about the future implementation of the CNO concept, however, deserves to be highlighted separately. A major impediment to cost containment would still remain in a CNO-type intervention: In general, nurses do not make decisions about use of the costliest services. Physicians make those decisions. The earlier assumption that the decisions of nurse case managers about a limited number of services could save money for Medicare was predicated on the assumption that prevention can be associated with cost savings. That assumption simply has not been demonstrated with respect to the Medicare population. At the end of the demonstration, the best prospects for CNO-type nurses impacting on both quality of care and cost containment appear to be as *community nursing partners to physicians* and as members of the aforementioned integrated service delivery teams. In those configurations, knowledge that would lead to better care and cost savings can have an impact on providers who make decisions about care.

10.8 References

Buerhaus, P.I. and D.O. Staiger. "Future of the Nurse Labor Market According to Health Executives in High Managed-Care Areas of the United States." *Image: Journal of Nursing Scholarship*, 1997: 29(4) 313-318

Rosenthal, E. "The H.M.O. Catch: When Healthier Isn't Cheaper." *The New York Times*, Section 4, March 16, 1997.

CDS LIBRARY



3 8095 00005828 5